INTERSTATE 5 COLUMBIA RIVER CROSSING

Traffic Technical Report for the Final Environmental Impact Statement

August 2011

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Cover Sheet

Interstate 5 Columbia River Crossing

Traffic Technical Report for the Final Environmental Impact Statement:

Submitted By:

Ryan LeProwse, PE, David Evans and Associates

With contributions by

Cameron Grile, PE, PTOE, David Evans and Associates

Zachary Horowitz, PE, David Evans and Associates

Shazia Malik, David Evans and Associates

David Parisi, PE, TE, Parisi Associates

John Replinger, PE, David Evans and Associates

Ryan LeProwse | 8/23/11
Signature | Date

RYAN S. LePROWSE
STATE OF WASHINGTON
44970
REGISTERED
PROFESSIONAL ENGINEER
Ryan LeProwse
8/23/11

REGISTERED PROFESSIONAL ENGINEER
59938PE
Ryan LeProwse
OREGON
July 12, 2005
RYAN S. LePROWSE
EXPIRATION DATE: 12/31/12

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ACRONYMS

Acronym	Description
ADA	Americans with Disabilities Act
ADT	Average Daily Traffic
APM	Analysis Procedures Manual
BNSF	Burlington Northern Santa Fe Railroad
CAGR	Compound Annual Growth Rate
CBD	Central Business District
CD	Collector/distributor
CRC	Columbia River Crossing
C-TRAN	Clark County Public Transit Benefit Area Authority
CTR	Commute Trip Reduction (Washington)
DEIS	Draft Environmental Impact Statement
DOT	U.S. Department of Transportation
ECO	Employee Commute Options (Oregon)
FEIS	Final Environmental Impact Statement
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HAC	High Accident Corridor
HAL	High Accident Location
HDM	Highway Design Manual
HOV	High Occupancy Vehicle
ICU	Intersection Capacity Utilization
LPA	Locally Preferred Alternative
LOS	Level-of-Service
LRT	Light Rail Transit
LRV	Light Rail Vehicle
MAX	Metropolitan Area Express
Metro	Metropolitan Service District
MPO	Metropolitan Planning Organization
MTP	Metropolitan Transportation Plan
MVMT	Million Vehicle Miles Traveled
ODOT	Oregon Department of Transportation
OHP	Oregon Highway Plan
ORT	Open Road Tolling
OTC	Oregon Transportation Commission
PDO	Property Damage Only
PBOT	Portland Bureau of Transportation
ROD	Record of Decision
RTC	Regional Transportation Council
RTP	Regional Transportation Plan
RTPO	Regional Transportation Planning Organization
SPIS	Safety Priority Index System
SPUI	Single Point Urban Interchange
SR	State Route
TDM	Transportation Demand Management
TPAC	Transportation Policy Alternatives Committee
TriMet	Tri-County Metropolitan Transportation District
TSM	Transportation System Management
TSP	Transportation System Plan
UP	Union Pacific Corporation

Acronym	Description
V/C	Volume-to-Capacity Ratio
VCCV	Vancouver Central City Vision
WSDOT	Washington Department of Transportation
WTC	Washington Transportation Commission

1. Project Purpose and Need

1.1 Project Description

The Columbia River Crossing (CRC) project is a bridge, transit, and highway improvement project for Interstate 5 between the states of Washington and Oregon. It is co-sponsored by the Oregon Department of Transportation (ODOT) and the Washington Department of Transportation (WSDOT) and is focused on addressing the congestion, mobility, and safety issues on I-5 between State Route 500 in Vancouver, Washington and Columbia Boulevard in Portland, Oregon.

This five-mile segment of I-5, referred to as the Bridge Influence Area or project area, includes seven interchanges. Interstate 5 in the Bridge Influence Area sustains recurrent congestion during the morning, midday and evening periods. The I-5 bridge is one of only two major interstate highway river crossings providing connectivity and mobility between Washington and Oregon in the Portland-Vancouver metropolitan region.

1.2 Project Purpose and Need

The purpose of the proposed action is to improve I-5 corridor mobility by addressing present and future travel demand and mobility needs in the CRC project area. Relative to the No-Build Alternative, the proposed action is intended to achieve the following objectives:

a) Improve travel safety and traffic operations on the Interstate 5 crossing's bridges and associated interchanges;

b) Improve connectivity, reliability, travel times, and operations of public transportation modal alternatives in the Bridge Influence Area;

c) Improve highway freight mobility and address interstate travel and commerce needs in the Bridge Influence Area;

d) Improve pedestrian and bicycle infrastructure and connections to regional trail networks; and

e) Improve the Interstate 5 river crossing's structural integrity.

The specific needs to be addressed by the proposed action include:

Growing Travel Demand and Congestion: Existing travel demand exceeds capacity in the CRC area on I-5 and associated interchanges. This corridor experiences heavy congestion and delay lasting two to six hours during both the morning and afternoon/evening peak travel periods and when traffic crashes, vehicle breakdowns, or bridge-lifts occur. Due to excess travel demand and congestion in the I-5 bridge corridor, many trips take the longer, alternative I-205 route across the river. Spillover traffic from

I-5 onto parallel arterials, such as Martin Luther King, Jr. Boulevard and Interstate Avenue increases local congestion. The two crossings carried over 280,000 trips across the Columbia River daily in 2005. Daily traffic demand over the I-5 crossing is projected to increase by 35 percent during the next 25 years, with stop-and-go conditions increasing to at least 15 hours each day if no improvements are made.

Impaired freight movement: I-5 is part of the National Truck Network and the most important freight highway on the West Coast. I-5 links international, national, and regional markets in Canada, Mexico, and the Pacific Rim with destinations throughout the western United States. In the center of the project area, I-5 intersects with the Columbia River's deep water shipping and barging channels as well as two transcontinental railroad mainlines. The I-5 crossing provides direct and important highway connections to the Port of Vancouver and Port of Portland facilities located on the Columbia River as well as the majority of the area's freight consolidation facilities and distribution terminals. Freight volumes moved by truck to and from the area are projected to more than double over the next 25 years. Vehicle-hours of delay on truck routes in the Portland-Vancouver area are projected to increase by more than 90 percent over the next 25 years. Growing demand and congestion will result in increasing delay, costs and uncertainty for all businesses that rely on this corridor for freight movement.

Limited public transportation operation, connectivity, and reliability: Due to limited public transportation options, a number of transportation markets are not well served. The key transit markets include trips between the Portland Central City and the City of Vancouver and Clark County, trips between North/Northeast Portland and the City of Vancouver and Clark County, and trips connecting the City of Vancouver and Clark County with the regional transit system in Oregon. Congestion in the corridor adversely impacts public transportation service reliability and travel speed. Southbound bus travel times across the bridge are currently up to three times longer during parts of the morning peak compared to off peak. Travel times for public transit using general-purpose lanes on I-5 are expected to increase substantially by 2030.

Safety and Vulnerability to Incidents: The I-5 river crossing and its approach sections experience crash rates over twice that of statewide averages for comparable facilities. Incident evaluations generally attribute these crashes to traffic congestion and weaving movements associated with closely spaced interchanges. Without breakdown lanes or shoulders, even minor traffic crashes or stalls cause severe delay or more serious accidents.

Substandard bicycle and pedestrian facilities: The bike/pedestrian facilities, which consist of shared sidewalks on the I-5 bridges, are generally no wider than four feet, narrower than the 14-foot standard, and are located extremely close to traffic lanes, thus impacting safety for pedestrians and bicyclists. Pedestrian and bicycle connectivity are poor in the Bridge Influence Area.

Seismic vulnerability: The existing I-5 bridges are located in a seismically active zone. They do not meet current seismic standards and are vulnerable to failure in an earthquake.

1.3 Project Vision and Values

The CRC project is being developed through an inclusive and collaborative process that builds upon the previous work of the I-5 Trade and Transportation Partnership. It seeks to deliver a financially feasible solution that sustains and stimulates a healthy community by addressing its mobility and transportation needs, strengthening the economy, protecting natural resources, and enhancing quality of life.

The CRC project should reach this vision through:

1.3.1 Mobility, Reliability, and Accessibility

- Ensuring mobility, reliability, and accessibility for all users, recognizing the requirements of local, intra-regional, and interstate movement now and in the future.

1.3.2 Modal Choice

- Providing attractive opportunities to use transit, bicycle, and pedestrian modes for travel across the I-5 bridge.

1.3.3 Safety

- Ensuring safety for vehicles (trucks, autos, emergency, and transit), pedestrians, bicyclists, river users, and air traffic at the crossing.

1.3.4 Community Livability

- Enhancing community livability. This would be done through:
    - Support of a healthy and vibrant land use mix of residential, commercial, industrial, recreational, cultural, and historic areas.
    - Consideration of air quality; aesthetic quality that achieves a regional landmark; community cohesion and avoidance of disruption; impacts of noise, light, and glare; and parks, historic resources, and cultural resources.

1.3.5 Freight Mobility

- Supporting a sound regional economy by addressing the need to move freight efficiently and reliably through the I-5 Bridge Influence Area and allow for river navigational needs.

1.3.6 Natural Resource Stewardship

- Respecting and protecting natural resources including fish, fish and wildlife habitat, and water quality.

1.3.7 Distribution of Impacts and Benefits

- Ensuring the fair distribution of benefits and adverse effects of the project for the region, communities, and neighborhoods adjacent to the project area.

1.3.8 Cost Effectiveness

- Ensuring cost effectiveness in design, construction, maintenance, and operation.

1.3.9 Financial Feasibility

- Ensuring a reliable funding plan for the project.

2. Description of Alternatives

This technical report evaluates the CRC project's locally preferred alternative (LPA) and the No-Build Alternative. The LPA includes two design options: The preferred option, LPA Option A, which includes local vehicular access between Marine Drive and Hayden Island on an arterial bridge; and LPA Option B, which does not have arterial lanes on the light rail/multi-use path bridge, but instead provides direct access between Marine Drive and Hayden Island with collector-distributor (CD) lanes on the two new bridges that would be built adjacent to I-5. In addition to the design options, if funding availability does not allow the entire LPA to be constructed in one phase, some roadway elements of the project would be deferred to a future date. This technical report identifies several elements that could be deferred, and refers to that possible initial investment as LPA with highway phasing. The LPA with highway phasing option would build most of the LPA in the first phase, but would defer construction of specific elements of the project. The LPA and the No-Build Alternative are described in this section.

2.1.1 Adoption of a Locally Preferred Alternative

Following the publication of the Draft Environmental Impact Statement (DEIS) on May 2, 2008, the project actively solicited public and stakeholder feedback on the DEIS during a 60-day comment period. During this time, the project received over 1,600 public comments.

During and following the public comment period, the elected and appointed boards and councils of the local agencies sponsoring the CRC project held hearings and workshops to gather further public input on and discuss the DEIS alternatives as part of their efforts to determine and adopt a locally preferred alternative. The LPA represents the alternative preferred by the local and regional agencies sponsoring the CRC project. Local agency-elected boards and councils determined their preference based on the results of the evaluation in the DEIS and on the public and agency comments received both before and following its publication.

In the summer of 2008, the local agencies sponsoring the CRC project adopted the following key elements of CRC as the LPA:

- A replacement bridge as the preferred river crossing,
- Light rail as the preferred high-capacity transit mode, and
- Clark College as the preferred northern terminus for the light rail extension.

The preferences for a replacement crossing and for light rail transit were identified by all six local agencies. Only the agencies in Vancouver – the Clark County Public Transit Benefit Area Authority (C-TRAN), the City of Vancouver, and the Regional Transportation Council (RTC) – preferred the Vancouver light rail terminus. The adoption of the LPA by these local agencies does not represent a formal decision by the federal agencies leading this project – the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) – or any federal funding commitment. A formal decision by FHWA and FTA about whether and how this project should be constructed will follow the FEIS in a Record of Decision (ROD).

2.1.2 Description of the LPA

The LPA includes an array of transportation improvements, which are described below. When the LPA differs between Option A and Option B, it is described in the associated section. For a more detailed description of the LPA, including graphics, please see Chapter 2 of the FEIS.

2.1.2.1 Multimodal River Crossing

Columbia River Bridges

The parallel bridges that form the existing I-5 crossing over the Columbia River would be replaced by two new parallel bridges. The eastern structure would accommodate northbound highway traffic on the bridge deck, with a bicycle and pedestrian path underneath; the western structure would carry southbound traffic, with a two-way light rail guideway below. Whereas the existing bridges have only three lanes each with virtually no shoulders, each of the new bridges would be wide enough to accommodate three through-lanes and two add/drop lanes. Lanes and shoulders would be built to full design standards.

The new bridges would be high enough to provide approximately 95 feet of vertical clearance for river traffic beneath, but not so high as to impede the take-offs and landings by aircraft using Pearson Field or Portland International Airport to the east. The new bridge structures over the Columbia River would not include lift spans, and both of the new bridges would each be supported by six piers in the water and two piers on land.

North Portland Harbor Bridges

The existing highway structures over North Portland Harbor would not be replaced; instead, they would be retained to accommodate all mainline I-5 traffic. As discussed at the beginning of this chapter, two design options have emerged for the Hayden Island and Marine Drive interchanges. The preferred option, LPA Option A, includes local vehicular access between Marine Drive and Hayden Island on an arterial bridge. LPA Option B does not have arterial lanes on the light rail/multi-use path bridge, but instead provides direct access between Marine Drive and the island with collector-distributor lanes on the two new bridges that would be built adjacent to I-5.

LPA Option A: Four new, narrower parallel structures would be built across the waterway, three on the west side and one on the east side of the existing North Portland Harbor bridges. Three of the new structures would carry on- and off-ramps to mainline I-5. Two structures west of the existing bridges would carry traffic merging onto or exiting off of I-5 southbound. The new structure on the east side of I-5 would serve as an on-ramp for traffic merging onto I-5 northbound.

The fourth new structure would be built slightly farther west and would include a two-lane arterial bridge for local traffic to and from Hayden Island, light rail transit, and a multi-use path for pedestrians and bicyclists. All of the new structures would have at least as much vertical clearance over the river as the existing North Portland Harbor bridges.

LPA Option B: This option would build the same number of structures over North Portland Harbor as Option A, although the locations and functions on those bridges would differ, as described below. The existing bridge over North Portland Harbor would be widened and would receive seismic upgrades.LPA Option B does not have arterial lanes on the light rail/multi-use path bridge. Direct access between Marine Drive and the island would be provided with collector-distributor lanes. The structures adjacent to the highway bridge would carry traffic merging onto or exiting off of mainline I-5 between the Marine Drive and Hayden Island interchanges.

2.1.2.2 Interchange Improvements

The LPA includes improvements to seven interchanges along a 5-mile segment of I-5 between Victory Boulevard in Portland and SR 500 in Vancouver. These improvements include some reconfiguration of adjacent local streets to complement the new interchange designs, as well as new facilities for bicyclists and pedestrians along this corridor.

Victory Boulevard Interchange

The southern extent of the I-5 project improvements would be two ramps associated with the Victory Boulevard interchange in Portland. The Marine Drive to I-5 southbound on-ramp would be braided over the I-5 southbound to the Victory Boulevard/Denver Avenue off-ramp. The other ramp improvement would lengthen the merge distance for northbound traffic entering I-5 from Denver Avenue. The current merging ramp would be extended to become an add/drop (auxiliary) lane which would continue across the river crossing.

***Potential phased construction option*:** The aforementioned southbound ramp improvements to the Victory Boulevard interchange may not be included with the CRC project. Instead, the existing connections between I-5 southbound and Victory Boulevard could be retained. The braided ramp connection could be constructed separately in the future as funding becomes available.

Marine Drive Interchange

All movements within this interchange would be reconfigured to reduce congestion for motorists entering and exiting I-5 at this location. The interchange configuration would be a single-point urban interchange (SPUI) with a flyover ramp serving the east to north movement. With this configuration, three legs of the interchange would converge at a point on Marine Drive, over the I-5 mainline. This configuration would allow the highest volume movements to move freely without being impeded by stop signs or traffic lights.

The Marine Drive eastbound to I-5 northbound flyover ramp would provide motorists with access to I-5 northbound without stopping. Motorists from Marine Drive eastbound would access I-5 southbound without stopping. Motorists traveling on Martin Luther

King Jr. Boulevard westbound to I-5 northbound would access I-5 without stopping at the intersection.

The new interchange configuration changes the westbound Marine Drive and westbound Vancouver Way connections to Martin Luther King Jr. Boulevard and to northbound I-5. These two streets would access westbound Martin Luther King Jr. Boulevard farther east. Martin Luther King Jr. Boulevard would have a new direct connection to I-5 northbound.

In the new configuration, the connections from Vancouver Way and Marine Drive would be served, improving the existing connection to Martin Luther King Jr. Boulevard east of the interchange. The improvements to this connection would allow traffic to turn right from Vancouver Way and accelerate onto Martin Luther King Jr. Boulevard. On the south side of Martin Luther King Jr. Boulevard, the existing loop connection would be replaced with a new connection farther east.

A new multi-use path would extend from the Bridgeton neighborhood to the existing Expo Center light rail station and from the station to Hayden Island along the new light rail line over North Portland Harbor.

LPA Option A: Local traffic between Martin Luther King Jr. Boulevard/Marine Drive and Hayden Island would travel via an arterial bridge over North Portland Harbor. There would be some variation in the alignment of local streets in the area of the interchange between Option A and Option B. The most prominent differences are the alignments of Vancouver Way and Union Court.

LPA Option B: With this design option, there would be no arterial traffic lanes on the light rail/multi-use path bridge over North Portland Harbor. Instead, vehicles traveling between Martin Luther King Jr. Boulevard/ Marine Drive and Hayden Island would travel on the collector-distributor bridges that would parallel each side of I-5 over North Portland Harbor. Traffic would not need to merge onto mainline I-5 to travel between the island and Martin Luther King Jr. Boulevard/Marine Drive.

***Potential phased construction option*:** The aforementioned flyover ramp could be deferred and not constructed as part of the CRC project. In this case, rather than providing a direct eastbound Marine Drive to I-5 northbound connection by a flyover ramp, the project improvements to the interchange would instead provide this connection through the signal-controlled SPUI. The flyover ramp could be constructed separately in the future as funding becomes available.

Hayden Island Interchange

All movements for this interchange would be reconfigured. The new configuration would be a split tight diamond interchange. Ramps parallel to the highway would be built, lengthening the ramps and improving merging speeds. Improvements to Jantzen Drive and Hayden Island Drive would include additional through, left-turn, and right-turn lanes. A new local road, Tomahawk Island Drive, would travel east-west through the middle of Hayden Island and under the I-5 interchange, improving connectivity across I-5 on the island. Additionally, a new multi-use path would be provided along the elevated light rail line on the west side of the Hayden Island interchange.

LPA Option A: A proposed arterial bridge with two lanes of traffic, one in each direction, would allow vehicles to travel between Martin Luther King Jr. Boulevard/ Marine Drive and Hayden Island without accessing I-5.

LPA Option B: With this design option there would be no arterial traffic lanes on the light rail/multi-use path bridge over North Portland Harbor. Instead, vehicles traveling between Martin Luther King Jr. Boulevard/Marine Drive and Hayden Island would travel on the collector-distributor bridges that parallel each side of I-5 over North Portland Harbor.

SR 14 Interchange

The function of this interchange would remain largely the same. Direct connections between I-5 and SR 14 would be rebuilt. Access to and from downtown Vancouver would be provided as it is today, but the connection points would be relocated. Downtown Vancouver I-5 access to and from the south would be at C Street rather than Washington Street, while downtown connections to and from SR 14 would be made by way of Columbia Street at 4th Street.

The multi-use bicycle and pedestrian path in the northbound (eastern) I-5 bridge would exit the structure at the SR 14 interchange, and then loop down to connect into Columbia Way.

Mill Plain Interchange

This interchange would be reconfigured into a SPUI. The existing “diamond” configuration requires two traffic signals to move vehicles through the interchange. The SPUI would use one efficient intersection and allow opposing left turns simultaneously. This would improve the capacity of the interchange by reducing delay for traffic entering or exiting the highway.

This interchange would also receive several improvements for bicyclists and pedestrians. These include bike lanes and sidewalks, clear delineation and signing, short perpendicular crossings at the ramp terminals, and ramp orientations that would make pedestrians highly visible.

Fourth Plain Interchange

The improvements to this interchange would be made to better accommodate freight mobility and access to the new park-and-ride facility near Clark College. Northbound I-5 traffic exiting to Fourth Plain would continue to use the off-ramp just north of the SR 14 interchange. The southbound I-5 exit to Fourth Plain would be braided with the SR 500 connection to I-5, which would eliminate the non-standard weave between the SR 500 connection and the off-ramp to Fourth Plain as well as the westbound SR 500 to Fourth Plain Boulevard connection.

Additionally, several improvements would be made to provide better bicycle and pedestrian mobility and accessibility, including bike lanes, neighborhood connections, and access to the park-and-ride facility.

SR 500 Interchange

Improvements would be made to the SR 500 interchange to add direct connections to and from I-5. On- and off-ramps would be built to directly connect SR 500 and I-5 to and from the north, connections that are currently made by way of 39th Street. I-5 southbound traffic would connect to SR 500 via a new tunnel underneath I-5. SR 500 eastbound traffic would connect to I-5 northbound on a new on-ramp. The 39th Street connections with I-5 to and from the north would be eliminated. Travelers would instead use the connections at Main Street to connect to and from 39th Street.

Additionally, several improvements would be made to provide better bicycle and pedestrian mobility and accessibility, including sidewalks on both sides of 39th Street, bike lanes, and neighborhood connections.

***Potential phased construction option*:** The northern half of the existing SR 500 interchange would be retained, rather than building new connections between I-5 southbound to SR 500 eastbound and from SR 500 westbound to I-5 northbound. The ramps connecting SR 500 and I-5 to and from the north could be constructed separately in the future as funding becomes available.

2.1.2.3 Transit

The primary transit element of the LPA is a 2.9-mile extension of the current Metropolitan Area Express (MAX) Yellow Line light rail from the Expo Center in North Portland, where it currently ends, to Clark College in Vancouver. The transit element would not differ between LPA and LPA with highway phasing. To accommodate and complement this major addition to the region’s transit system, a variety of additional improvements are also included in the LPA:

- Three park-and-ride facilities in Vancouver near the new light rail stations.
- Expansion of Tri-County Metropolitan Transportation District’s (TriMet’s) Ruby Junction light rail maintenance base in Gresham, Oregon.
- Changes to C-TRAN local bus routes.
- Upgrades to the existing light rail crossing over the Willamette River via the Steel Bridge.

Operating Characteristics

Nineteen new light rail vehicles (LRV) would be purchased as part of the CRC project to operate this extension of the MAX Yellow Line. These vehicles would be similar to those currently used by TriMet’s MAX system. With the LPA, LRVs in the new guideway and in the existing Yellow Line alignment are planned to operate with 7.5-minute headways during the “peak of the peak” (the two-hour period within the 4-hour morning and afternoon/evening peak periods where demand for transit is the highest) and 15-minute headways during off-peak periods.

Light Rail Alignment and Stations

Oregon Light Rail Alignment and Station

A two-way light rail alignment for northbound and southbound trains would be constructed to extend from the existing Expo Center MAX station over North Portland Harbor to Hayden Island. Immediately north of the Expo Center, the alignment would curve eastward toward I-5, pass beneath Marine Drive, then rise over a flood wall onto a light rail/multi-use path bridge to cross North Portland Harbor. The double-track guideway over Hayden Island would be elevated at approximately the height of the rebuilt mainline of I-5, as would a new station immediately west of I-5. The alignment would extend northward on Hayden Island along the western edge of I-5, until it transitions into the hollow support structure of the new western bridge over the Columbia River.

Downtown Vancouver Light Rail Alignment and Stations

After crossing the Columbia River, the light rail alignment would curve slightly west off of the highway bridge and onto its own smaller structure over the Burlington Northern Santa Fe (BNSF) rail line. The double-track guideway would descend on structure and touch down on Washington Street south of 5th Street, continuing north on Washington Street to 7th Street. The elevation of 5th Street would be raised to allow for an at-grade crossing of the tracks on Washington Street. Between 5th and 7th Streets, the double-track guideway would run down the center of the street. Traffic would not be allowed on Washington between 5th and 6th Streets and would be two-way between 6th and 7th Streets. There would be a station on each side of the street on Washington between 5th and 6th Streets.

At 7th Street, the light rail alignment would form a couplet. The single-track northbound guideway would turn east for two blocks, then turn north onto Broadway Street, while the single-track southbound guideway would continue on Washington Street. Seventh Street will be converted to one-way traffic eastbound between Washington and Main Street with light rail operating on the north side of 7th Street. This couplet would extend north to 17th Street, where the two guideways would join and turn east.

The light rail guideway would run on the east side of Washington Street and the west side of Broadway Street, with one-way traffic southbound on Washington Street and one-way traffic northbound on Broadway Street. On station blocks, the station platform would be on the side of the street at the sidewalk. There would be two stations on the Washington-Broadway couplet, one pair of platforms near Evergreen Boulevard, and one pair near 15th Street.

East-West Light Rail Alignment and Terminus Station

The single-track southbound guideway would run in the center of 17th Street between Washington and Broadway Streets. At Broadway Street, the northbound and southbound alignments of the couplet would become a double-track, center-running guideway traveling east-west on 17th Street. The guideway on 17th Street would run until G Street, then connect with McLoughlin Boulevard and cross under I-5. Both alignments would end at a station east of I-5 on the western boundary of Clark College.

Park-and-Ride Stations

Three park-and-ride stations would be built in Vancouver along the light rail alignment:

- Within the block surrounded by Columbia, Washington, 4th and 5th Streets, with five floors above ground that include space for retail on the first floor and 570 parking stalls.
- Between Broadway and Main Streets next to the stations between 15th and 16th Streets, with space for retail on the first floor, and four floors above ground that include 420 parking stalls.
- At Clark College, just north of the terminus station, with space for retail or C-TRAN services on the first floor, and five floors that include approximately 1,910 parking stalls.

Ruby Junction Maintenance Facility Expansion

The Ruby Junction Maintenance Facility in Gresham, Oregon, would be expanded to accommodate the additional LRVs associated with the CRC project. Improvements include additional storage for LRVs and other maintenance material, expansion of LRV maintenance bays, and expanded parking for additional personnel. A new operations command center would also be required, and would be located at the TriMet Center Street location in Southeast Portland.

Local Bus Route Changes

As part of the CRC project, several C-TRAN bus routes would be changed in order to better complement the new light rail system. Most of these changes would re-route bus lines to downtown Vancouver where riders could transfer to light rail. Express routes, other than those listed below, are expected to continue service between Clark County and downtown Portland. The following table **Exhibit 2-1** shows anticipated future changes to C-TRAN bus routes.

Exhibit 2-1. Proposed C-TRAN Bus Routes Comparison

C-TRAN Bus Route	Route Changes
#4 - Fourth Plain	Route truncated in downtown Vancouver
#41 - Camas / Washougal Limited	Route truncated in downtown Vancouver
#44 - Fourth Plain Limited	Route truncated in downtown Vancouver
#47 - Battle Ground Limited	Route truncated in downtown Vancouver
#105 - I-5 Express	Route truncated in downtown Vancouver
#105S - I-5 Express Shortline	Route eliminated in LPA (The No-Build runs articulated buses between downtown Portland and downtown Vancouver on this route)

Steel Bridge Improvements

Currently, all light rail lines within the regional TriMet MAX system cross over the Willamette River via the Steel Bridge. By 2030, the number of LRVs that cross the Steel Bridge during the 4-hour PM peak period would increase from 152 to 176. To accommodate these additional trains, the project would retrofit the existing rails on the Steel Bridge to increase the allowed light rail speed over the bridge from 10 to 15 mph. To accomplish this, additional work along the Steel Bridge lift spans would be needed.

2.1.2.4 Tolling

Tolling cars and trucks that use the I-5 river crossing is proposed as a method to help fund the CRC project and to encourage the use of alternative modes of transportation. The authority to toll the I-5 crossing is set by federal and state laws. Federal statutes permit a toll-free bridge on an interstate highway to be converted to a tolled facility following the reconstruction or replacement of the bridge. Prior to imposing tolls on I-5, Washington and Oregon Departments of Transportation (WSDOT and ODOT) would have to enter into a toll agreement with U.S. Department of Transportation (DOT). Recently passed state legislation in Washington permits WSDOT to toll I-5 provided that the tolling of the facility is first authorized by the Washington legislature. Once authorized by the legislature, the Washington Transportation Commission (WTC) has the authority to set the toll rates. In Oregon, the Oregon Transportation Commission (OTC) has the authority to toll a facility and to set the toll rate. It is anticipated that prior to tolling I-5, ODOT and WSDOT would enter into a bi-state tolling agreement to establish a cooperative process for setting toll rates and guiding the use of toll revenues.

Tolls would be collected using an electronic toll collection system: toll collection booths would not be required. Instead, motorists could obtain a transponder that would automatically bill the vehicle owner each time the vehicle crossed the bridge, while cars without transponders would be tolled by a license-plate recognition system that would bill the address of the owner registered to that license plate.

The LPA proposes to apply a variable toll on vehicles using the I-5 crossing. Tolls would vary by time of day, with higher rates during peak travel periods and lower rates during off-peak periods. Medium and heavy trucks would be charged a higher toll than passenger vehicles. The traffic-related impact analysis in this FEIS is based on toll rates that, for passenger cars with transponders, would range from $1.00 during the off-peak to $2.00 during the peak travel times (in 2006 dollars).

2.1.2.5 Transportation System and Demand Management Measures

Many well-coordinated transportation demand management (TDM) and transportation system management (TSM) programs are already in place in the Portland-Vancouver Metropolitan region and supported by agencies and adopted plans. In most cases, the impetus for the programs is from state-mandated programs: Oregon’s Employee Commute Options (ECO) rule and Washington’s Commute Trip Reduction (CTR) law.

The physical and operational elements of the CRC project provide the greatest TDM opportunities by promoting other modes to fulfill more of the travel needs in the project corridor. These include:

- Major new light rail line in exclusive right-of-way, as well as express bus and feeder routes;
- Modern bicycle and pedestrian facilities that accommodate more bicyclists and pedestrians, and improve connectivity, safety, and travel time;
- Park-and-ride lots and garages; and
- A variable toll on the highway crossing.

In addition to these fundamental elements of the project, facilities and equipment would be implemented that could help existing or expanded TSM programs maximize capacity and efficiency of the system. These include:

- Replacement or expanded variable message signs or other traveler information systems in the CRC project area;
- Expanded incident response capabilities;
- Queue jumps or bypass lanes for transit vehicles where multi-lane approaches are provided at ramp signals for entrance ramps;
- Expanded traveler information systems with additional traffic monitoring equipment and cameras, and
- Active traffic management.

2.1.3 LPA Construction

Construction of bridges over the Columbia River is the most substantial element of the project, and this element sets the sequencing for other project components. The main river crossing and immediately adjacent highway improvement elements would account for the majority of the construction activity necessary to complete this project.

2.1.3.1 Construction Activities Sequence and Duration

The following table **Exhibit 2-2** displays the expected duration and major details of each element of the project. Due to construction sequencing requirements, the timeline to complete the initial phase of the LPA with highway phasing is the same as the full LPA.

Exhibit 2-2. Construction Activities and Estimated Duration

Element	Estimated Duration	Details
Columbia River bridges	4 years	• Construction is likely to begin with the bridges. • General sequence includes initial preparation, installation of foundation piles, shaft caps, pier columns, superstructure, and deck.
Hayden Island and SR 14 interchanges	1.5 - 4 years for each interchange	• Both interchanges must be partially constructed before any traffic can be transferred to the new structure. • Each interchange needs to be completed at the same time.
Marine Drive interchange	3 years	• Construction would need to be coordinated with construction of the southbound lanes coming from Vancouver.
Demolition of the existing bridge	1.5 years	• Demolition of the existing bridges can begin only after traffic is rerouted to the new bridges.
Three interchanges north of SR 14	4 years for all three	• Construction of these interchanges could be independent from each other or from the southern half of the project. • More aggressive and costly staging could shorten this timeframe.
Light rail	4 years	• The river crossing for the light rail would be built with the bridges. • Any bridge structure work would be separate from the actual light rail construction activities and must be completed first.
Total construction timeline	6.3 years	• Funding, as well as contractor schedules, regulatory restrictions on in-water work, weather, materials, and equipment, could all influence construction duration. • This is also the same time required to complete the smallest usable segment of roadway – Hayden Island through SR 14 interchanges.

2.1.3.2 Major Staging Sites and Casting Yards

Staging of equipment and materials would occur in many areas along the project corridor throughout construction, generally within existing or newly purchased right-of-way or on nearby vacant parcels. However, at least one large site would be required for construction offices, to stage the larger equipment such as cranes, and to store materials such as rebar and aggregate. Suitable sites must be large and open to provide for heavy machinery and material storage, must have waterfront access for barges (either a slip or a dock capable of handling heavy equipment and material) to convey material to the construction zone, and must have roadway or rail access for landside transportation of materials by truck or train.

Three sites have been identified as possible major staging areas:

1. Port of Vancouver (Parcel 1A) site in Vancouver: This 52-acre site is located along SR 501 and near the Port of Vancouver's Terminal 3 North facility.

2. Red Lion at the Quay hotel site in Vancouver: This site would be partially acquired for construction of the Columbia River Crossing, which would require the demolition of the building on this site, leaving approximately 2.6 acres for possible staging.
3. Vacant Thunderbird hotel site on Hayden Island: This 5.6-acre site is much like the Red Lion hotel site in that a large portion of the parcel is already required for new right-of-way necessary for the LPA.

A casting/staging yard could be required for construction of the over-water bridges if a precast concrete segmental bridge design is used. A casting yard would require access to the river for barges, including either a slip or a dock capable of handling heavy equipment and material; a large area suitable for a concrete batch plant and associated heavy machinery and equipment; and access to a highway and/or railway for delivery of materials.

Two sites have been identified as possible casting/staging yards:

1. Port of Vancouver Alcoa/Evergreen West site: This 95-acre site was previously home to an aluminum factory and is currently undergoing environmental remediation, which should be completed before construction of the CRC project begins (2012). The western portion of this site is best suited for a casting yard.
2. Sundial site: This 50-acre site is located between Fairview and Troutdale, just north of the Troutdale Airport, and has direct access to the Columbia River. There is an existing barge slip at this location that would not have to undergo substantial improvements.

2.1.4 The No-Build Alternative

The No-Build Alternative illustrates how transportation and environmental conditions would likely change by the year 2030 if the CRC project is not built. This alternative makes the same assumptions as the build alternatives regarding population and employment growth through 2030, and also assumes that the same transportation and land use projects in the region would occur as planned. The No-Build Alternative also includes several major land use changes that are planned within the project area, such as the Riverwest development just south of Evergreen Boulevard and west of I-5, the Columbia West Renaissance project along the western waterfront in downtown Vancouver, and redevelopment of the Jantzen Beach shopping center on Hayden Island. All traffic and transit projects within or near the CRC project area that are anticipated to be built by 2030 separately from this project are included in the No-Build and build alternatives. Additionally, the No-Build Alternative assumes bridge repair and continuing maintenance costs to the existing bridge that are not anticipated with the replacement bridge option.

3. Transportation Analysis Methodology

3.1 Study Area

Exhibit 3-1 (illustrated at the end of this chapter) shows the transportation study area for the CRC project. The five-mile segment of I-5 referred to as the Bridge Influence Area includes seven interchanges: State Route 500, Fourth Plain Boulevard, Mill Plain Boulevard, and City Center/State Route 14 in Vancouver; and Hayden Island, Marine Drive, and Interstate Avenue/Victory Boulevard in Portland. The Bridge Influence Area includes the Interstate Bridges and the North Portland Harbor bridge.

A larger, 23-mile-long study area inclusive of the Bridge Influence Area was used for analyzing traffic effects for the CRC project. The longer area was used to provide a more rigorous and inclusive approach to the traffic modeling and analysis. The northern boundary of this corridor is located at the Pioneer Street/SR 501 interchange in Ridgefield, Washington. In total, 11 interchanges are included in the 14-mile-long segment of the study area in Washington. In Oregon, the southern boundary of the 23-mile-long area is the Marquam Bridge, where I-5 crosses the Willamette River near downtown Portland. In total, 12 interchanges are located in the 9-mile-long segment of the study area in Oregon.

To develop an understanding of the possible effects of tolling in conjunction with potential improvements to the bridge, highway and transit networks, a 9-mile segment of I-205 in Washington and Oregon was examined. The segment of highway includes the Glenn Jackson Bridge over the Columbia River. The northern boundary of the I-205 study area is at the SR 500 interchange with I-205 in Vancouver. The southern boundary of the 9-mile corridor is the southernmost interchange of I-84 and I-205 in Portland, near the Gateway area. There are a total of six interchanges included in the study area, three in Washington and three in Oregon.

A number of local street intersections were evaluated. Signalized and unsignalized intersections in Vancouver and Portland were studied to determine the effects of potential improvements to the bridge, highway and transit networks would have on local street operations. The local street operations study included the ramp terminals at the I-5 highway interchanges located within the Bridge Influence Area. For the existing conditions analysis a total of 73 intersections in Vancouver and 25 intersections in Portland were examined; the total includes the I-5 ramp terminals in the project area. The number of intersections increased under the future scenarios.

3.2 Study Periods

The traffic analysis focused on existing conditions (generally in 2005 to 2007) and projected year 2030 conditions. Current traffic volumes within the study area are typically at their highest on weekdays between 6 and 10 a.m. and between 3 and 7 p.m.

This trend is expected to continue into the future. The majority of the traffic performance analyses conducted for this report focuses on these two weekday peak periods, although certain data has been extrapolated to cover a 16-hour period from 5 a.m. to 9 p.m. In addition, some data is presented for a daily (24-hour) period.

Metro's regional travel demand model was used to report existing and future region-wide transportation measures. Metro's model is calibrated to year 2005 conditions and it is used to predict 2030 conditions.

3.3 Data Collection

The foundation of any traffic operations analysis is a clear and thorough understanding of existing conditions through the collection of detailed traffic data. The CRC project area contains a diverse transportation system with a highway system, a network of local area roads, and bicycle and pedestrian systems. The traffic composition within the study area is a very diverse mix with commuters, heavy truck traffic, transit users, local business and residential traffic, and bicycle and pedestrian users.

The traffic data used in this analysis was primarily collected during the fall of 2005. Supplemental data was collected during the summer of 2006 and during the spring and summer of 2007. Data included traffic volumes along the highway and at ramp terminals, local intersection turning movement counts, vehicle classification surveys, travel lane utilization surveys, travel speeds, vehicle occupancy counts, vehicle origin-destination data, and bicycle and pedestrian counts.

The various traffic counts and surveys collected for this study were collected at sites that were identified through discussions with ODOT, WSDOT, City of Vancouver, and City of Portland staff.

3.4 Travel Demand Forecasting Overview

Travel demand models use a market-based approach by considering both the transportation supply and travel demand for producing future mobility characteristics such as roadway traffic volumes and transit ridership.

The two Metropolitan Planning Organizations (MPO) in the Portland-Vancouver metropolitan area are the Metropolitan Service District (Metro), and the Southwest Washington Regional Transportation Council (RTC). Both organizations have travel demand modeling capability and a long history of successfully coordinating their modeling activities. For the purposes of the analysis, it was determined that Metro would lead the modeling effort, supported closely by the RTC. The regional travel model at Metro was expanded to include population and employment forecasts from southwest Washington that were approved by Clark County and its cities.

The regional travel demand model uses a four-step process, shown in **Exhibit 3-2**, which includes the following components:

- **Trip generation** determines the location, magnitude, and purpose of trip-making based on land use and socioeconomic input data.

- **Trip distribution** identifies origin and destination travel patterns by calculating trip lengths and travel times from transportation system attributes.
- In **mode choice**, trips are sorted into the various vehicle, transit, and in some cases, walk and bike modes.
- Through **trip assignment**, routing paths for vehicle and transit trips are determined for several time periods throughout the day.

Several traffic modeling tools were used to forecast travel demands and evaluate traffic operations. These are explained in the following sections.

3.4.1 EMME/2

The EMME/2 transportation modeling software program assigns regional travel demands to a transportation network using an equilibrium assignment. The assignment results in roadway link volumes where no traveler can achieve additional travel time savings by changing routes. The software program itself is used to edit highway networks, analyze data, display and plot results, and import and export data.

The transportation analysis used Metro's regional travel forecasting model to simulate highway and transit option packages to derive transportation performance measures. The highway and transit assignments were done using the EMME/2 software package.

3.4.2 VISUM

VISUM is a comprehensive, flexible software system for transportation planning, travel demand modeling, and network data management. Designed for multimodal analysis, VISUM integrates all relevant modes of transportation (i.e., car, car passenger, truck, bus, train, pedestrians, and bicyclists) into one comprehensive network model while providing a variety of assignment procedures. VISUM provides direct network linkage capabilities to VISSIM (see description below). This linkage facilitates network building and permits the use of dynamic path building (i.e., not fixed routes) in VISSIM.

The region including Metro, RTC, and many agencies in the Portland-Vancouver region are currently transitioning from EMME/2 to the VISUM assignment software. Most of the outputs derived during the Final Environmental Impact Statement (FEIS) analysis were prepared using EMME/2. However, auto assignment information was developed using VISUM for flow bundle analyses and traffic operations work.

3.4.3 VISSIM

VISSIM is a microscopic, behavior-based multi-purpose traffic simulation program. For many engineering disciplines, simulation has become an indispensable instrument for the optimization of complex technical systems. This is especially true for transportation planning and traffic engineering, where simulation is an invaluable and cost-reducing tool.

VISSIM offers a wide variety of urban and highway applications, integrating public and private transportation. The traffic simulation model is able to model complex traffic conditions and is capable of analyzing traffic operations under both uncongested and congested conditions. VISSIM is explained further in Section 3.5.1.

3.4.4 Synchro/SimTraffic

Synchro is a software application for optimizing traffic signal timing and performing intersection capacity analysis. The software optimizes traffic signal splits, offsets, and cycle lengths for individual intersections, an arterial, or a complete network. SimTraffic is a microscopic model that simulates individual vehicles using the roadway network.

As a microscopic model SimTraffic animates traffic flow based on input volumes and signal timing and is able to model congested conditions on arterials, including overcapacity operations at signalized intersections, unbalanced lane utilization and vehicle queue build up, and dissipation over morning and afternoon/evening peak periods. SimTraffic models signalized and unsignalized intersections, and roadway segments with automobiles, trucks, pedestrians, and buses. By basing the traffic analysis on driver behavior (driver reaction to the environment) rather than individual capacities, SimTraffic is able to model arterials as a traffic system, where congestion at one intersection influences operations both upstream and downstream of that intersection.

3.5 Traffic Operations Overview

3.5.1 I-5 and I-205 Operations

Simulation modeling is a useful tool for designing improvements and evaluating operations on a roadway system. Simulation models enable engineers to predict the outcome of a proposed change to the roadway before it is implemented and help evaluate the merits and demerits of design options. Models are set up to predict system responses by calibrating to the model to reflect existing traffic conditions. Calibration is a process of adjusting model parameters so that simulated responses agree with measured field conditions.

Traffic simulation may be macroscopic or microscopic in nature. While macroscopic models describe the traffic process with aggregate quantities, such as flow and density, microscopic models describe the behavior of the individual drivers as they react to their perceived environments. The aggregate response in the latter case is the result of interactions among many driver/vehicle entities. Microscopic models are helpful in capturing the more detailed aspects of the system (e.g., interacting bottlenecks, closely spaced intersections, and unusual lane utilization).

For the study of I-5 operations, VISSIM was selected as the environment for micro-simulation modeling. VISSIM was supplemented by VISUM, a macro-simulation model for providing traffic flow information as mentioned under **Section 3.4**.

VISSIM is the stochastic traffic simulator that uses the psycho-physical driver behavior model. VISSIM combines a perceptual model of the driver with a vehicle model. Every driver with his or her specific behavior characteristics is assigned to a specific vehicle. As a result, driver behavior corresponds to the technical capabilities of a vehicle. The behavior model for the driver involves a classification of reactions in response to the perceived relative speed and distance with respect to the preceding vehicle. Drivers can make the decision to change lanes that can either be forced by a routing requirement, or made by the driver to access a faster-moving lane. Four driving modes are defined: free driving, approaching, following, and braking. In each mode, the driver behaves differently, reacting either to his following distance or trying to match a prescribed target speed.

VISSIM was selected for analysis due to its multimodal modeling capabilities that may include cars, trucks, and buses. Another benefit of using VISSIM is that it can simulate unique operational conditions, high occupancy vehicle (HOV) lanes, toll lanes, exclusive lanes, merging/diverging, and weaving areas. It also has visualization capabilities that make it easier to visualize design options.

3.5.2 Local Street Operations

At signalized intersections, level-of-service (LOS) is a function of control delay, which includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. Both delays and volume-to-capacity (V/C) ratios are calculated for all movements at a signalized intersection since all movements are stopped at some time during the signal cycle. Some movements, particularly side street approaches or left turns onto side streets, may experience longer delays because they receive only a small portion of the green signal time during a signal cycle but their V/C ratio may be relatively low. It is important to examine both factors – delay and V/C ratio – before drawing conclusions about operational performance. A third variable, the intersection capacity utilization (ICU) value was also determined for each intersection. The ICU is the sum of time required to serve all movements at saturation given a reference cycle length, divided by the reference cycle length.

At stop-sign controlled intersections, LOS is also a function of control delay. In addition to calculating delay, the analysis also calculates the V/C ratio for all stopped movements at the intersection. Although delays can sometimes be long for some movements at stop-sign controlled intersections, the V/C ratio may indicate that there is adequate capacity to process the demand for that movement.

Key signal-controlled and stop-sign controlled intersections were evaluated with the Synchro/SimTraffic analysis software package, which uses methodology outlined in the *2000 Highway Capacity Manual* prepared by the Transportation Research Board. **Exhibit 3-3** summarizes the LOS criteria for both signalized and unsignalized intersections based on the manual's criteria. All SimTraffic data presented in this technical report consist of the averaged results across a stochastic, randomized five-seed set of simulation outputs.

The LOS for unsignalized intersections is somewhat different than the criteria used for signalized intersections. The primary reason for this is that drivers expect different levels of performance from different kinds of transportation facilities. In general, the expectation is that a signalized intersection is designed to accommodate higher traffic volumes than an unsignalized intersection. Additionally, several driver behavior considerations combine to make delays at signalized intersections less onerous than at unsignalized intersections. For example, drivers at signalized intersections are able to relax during the red interval, while drivers on the minor street approaches to two-way stop-sign controlled intersections must remain attentive to the task of identifying acceptable gaps and vehicle conflicts. Also, there is often much more variability in the amount of delay experienced by individual drivers at unsignalized intersections than signalized intersections. For these reasons, the total delay threshold for any given LOS is considered to be less for an unsignalized intersection than for a signalized intersection.

The SimTraffic queuing results are reported when the 95th percentile vehicle queue length exceeds the available vehicle storage distance in a left- or right-turn turn lane, or when the vehicle queue length exceeds the distance between two intersections. For left- and right-turn lanes, the 95th percentile queue length is reported. In the case where the 95th percentile queue length exceeds the distance between two intersections, the queue distance reported is limited to the distance between those two intersections. In this situation, the queuing result is accompanied by a note indicating that the vehicle queue extends back into the upstream intersection. Queues for through movements are reported in this manner to allow the 95th percentile queuing distance at the upstream intersection to be attributed only to that intersection.

“Screenlines” are imaginary lines drawn across a series of parallel roadways and are used to evaluate traffic demand changes. This method involves measuring entering and exiting traffic volumes across key north-south and east-west axes. Comparison of screenline volumes yields information regarding the performance of local streets, including increased or decreased traffic volumes resulting from specific actions.

3.5.3 Development of Performance Standards

Local traffic impacts are measured by impacts to intersection LOS, delay, and queuing. WSDOT, ODOT, the City of Vancouver, the City of Portland, RTC and Metro all have definable standards for intersection operations. A description of the development and application of these standards to local street operations is provided below.

3.5.3.1 WSDOT and City of Vancouver Standards

The Washington State Department of Transportation defers to the local MPO or Regional Transportation Planning Organization (RTPO) for LOS thresholds on “Highways of Regional Significance.” The RTC has adopted LOS E as the standard for urban state highways. For the purposes of the analysis of local Vancouver street intersections, including ramp terminals, the concurrency standards developed by the City of Vancouver are solely applied. **Exhibit 3-4** summarizes the intersection standards for WSDOT and the City of Vancouver.

The City of Vancouver, in compliance with WSDOT requirements, has identified and recommended LOS standards for all intersections within the city. The description of these standards is provided in the 2003 Vancouver Concurrency Administration Manual. Acceptable signalized intersection operating levels (the average weighted delay for all vehicles entering the intersection) shall not exceed 55 seconds (LOS D), with exception of traffic signals located downtown (south of McLoughlin Boulevard on the west side of

I-5). The acceptable intersection operating LOS for downtown is LOS E, a per-vehicle delay less than 80 seconds. For stop-controlled and other unsignalized intersections, a per-vehicle delay less than 50 seconds (LOS E) is considered acceptable operations by the City of Vancouver.

3.5.3.2 ODOT and City of Portland Standards

The ODOT Analysis Procedures Manual (APM) requires that the performance standards from the Oregon Highway Plan (OHP) be used to analyze existing conditions and No-Build scenarios. The stated V/C standard for ramp terminals in the OHP is 0.85, and is used for evaluation of the existing and No-Build scenarios. In addition to the ramp terminals, ODOT has jurisdiction over Lombard Street, and along Martin Luther King, Jr. Boulevard between the I-5 Marine Drive ramp terminal and Columbia Boulevard. The OHP V/C standard for these intersections is 0.99.

The APM states that the operational performance standards based on the V/C and contained in the Highway Design Manual (HDM) are to be used for the evaluation of all build cases. Interstate-5, for the entire length of the project area, is categorized as an Interstate Highway and Statewide Expressway, is located inside of an Urban Growth Boundary and within an MPO. Therefore, according to Table 10-1 of the HDM, the V/C standard that applies to the ramp terminals in the LPA and LPA with highway phasing scenarios is 0.75. For ramp terminals in the LPA and LPA with highway phasing scenarios that remain unchanged from No-Build, a V/C standard of 0.85 applies. Other intersections that would be constructed in the LPA or LPA with highway phasing, and be under ODOT's jurisdiction, would have a V/C standard between 0.75 and 0.85, depending on the cross-street roadway classification type of the facility. For all other intersections in the study area under ODOT's jurisdiction, a V/C standard of 0.99, as stated in the OHP, will be applied to the build alternatives.

The results from the Synchro/SimTraffic intersection models for the ramp terminals, the intersections along Lombard Street, and the intersections along Martin Luther King Jr. Boulevard are measured against the above standards for both the morning and afternoon/evening peak hours. **Exhibit 3-5** summarizes the intersection standards for ODOT.

For the non-ramp terminal intersections in the Portland, LOS standards from the Portland Bureau of Transportation (PBOT) apply. Like ODOT, PBOT has two tiers of standards – one that is used for the analysis of the No-Build scenario and one for the build scenarios. The level-of-service standard in the PBOT's Transportation System Plan (TSP) states that signalized intersections must meet LOS D in the No-Build scenario. Unsignalized intersections must meet a standard of LOS E. These standards also apply to the build scenarios. However, in the case where intersections in the build scenario do not meet the LOS standard, they are still considered to be performing acceptably if they "do no worse" than the No-Build scenario, consistent with PBOT's usual practice. That is, intersections in the build scenario which fail to meet the LOS D/E standard, but perform better than under the No-Build scenario, meet PBOT's requirements. **Exhibit 3-5** summarizes the intersection standards for the City of Portland.

For purposes of the FEIS, if the project would degrade an intersection's performance to an unacceptable LOS, the project will work with the operating jurisdiction to develop a cost-effective solution to mitigate the intersection performance to the minimum of the peak hour standard. If vehicular queuing blockages occur with both the No-Build Alternative and the project, then the project would be mitigated to No-Build conditions.

If the project causes traffic signal warrants, safety criteria or other criteria to be met, the project would be designed to meet applicable standards and mitigate for the impacts.

3.6 Performance Criteria

Project performance criteria were developed based on CRC's Purpose and Need statement and Vision and Values statement (see **Sections 1.2 and 1.3**). Ten categories of performance criteria were established. Four of the categories relate directly to traffic and safety measures:

- Mobility, reliability, accessibility, congestion reduction and efficiency;
- Modal choice;
- Safety; and
- Regional economy and freight mobility.

The following sections describe specific measures used to evaluate each of the traffic and safety related criterion in the I-5 corridor within the Bridge Influence Area.

3.6.1 Mobility, Reliability, Accessibility, Congestion Reduction and Efficiency

Measures used to evaluate mobility, reliability, accessibility, congestion reduction, and efficiency include:

- Reduction in travel times and delays.
- Reduction in the number of hours of highway congestion.
- Improvement in person throughput of the I-5 river crossing.
- Improvement in vehicle throughput of the I-5 river crossing.

3.6.2 Modal Choice

Measures used to evaluate modal choice include:

- Improvement in pedestrian/bicycle connectivity
- Increase in vehicle occupancy.

3.6.3 Safety

Measures used to evaluate safety include:

- Enhancement in vehicle/freight safety.
- Enhancement in pedestrian/bicycle facilities and safety.

3.6.4 Regional Economy; Freight Mobility

Measures used to evaluate regional economy and freight mobility include:

- Reduction in travel times and delays for vehicle-moved freight.
- Improvement in freight truck throughput of the I-5 river crossing.
- Improvement in vehicle throughput of the I-5 river crossing.

The performance results for each project alternative are summarized in **Section 4. Alternatives Performance Summary**.

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Exhibit 3-1
CRC Traffic Study Area

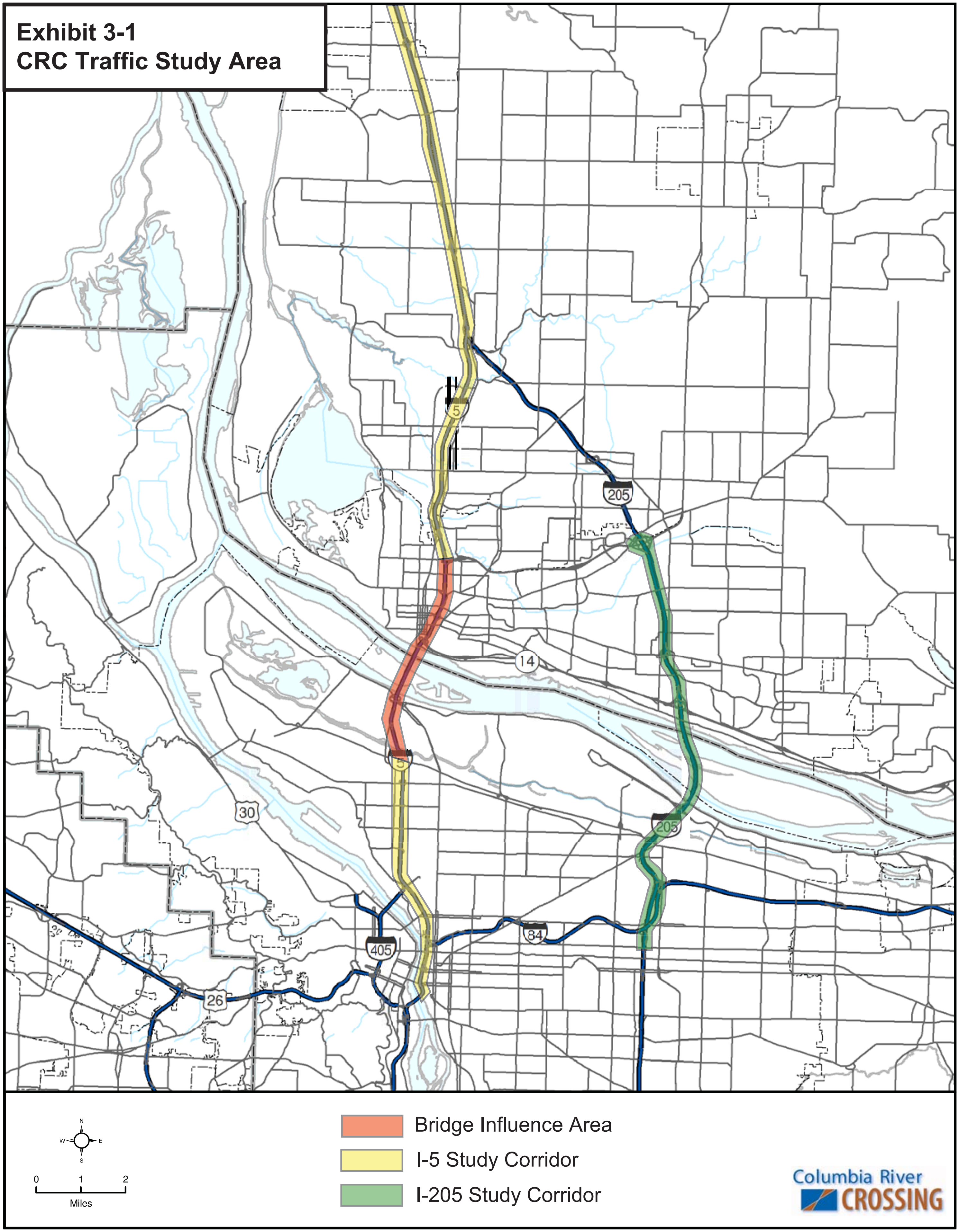
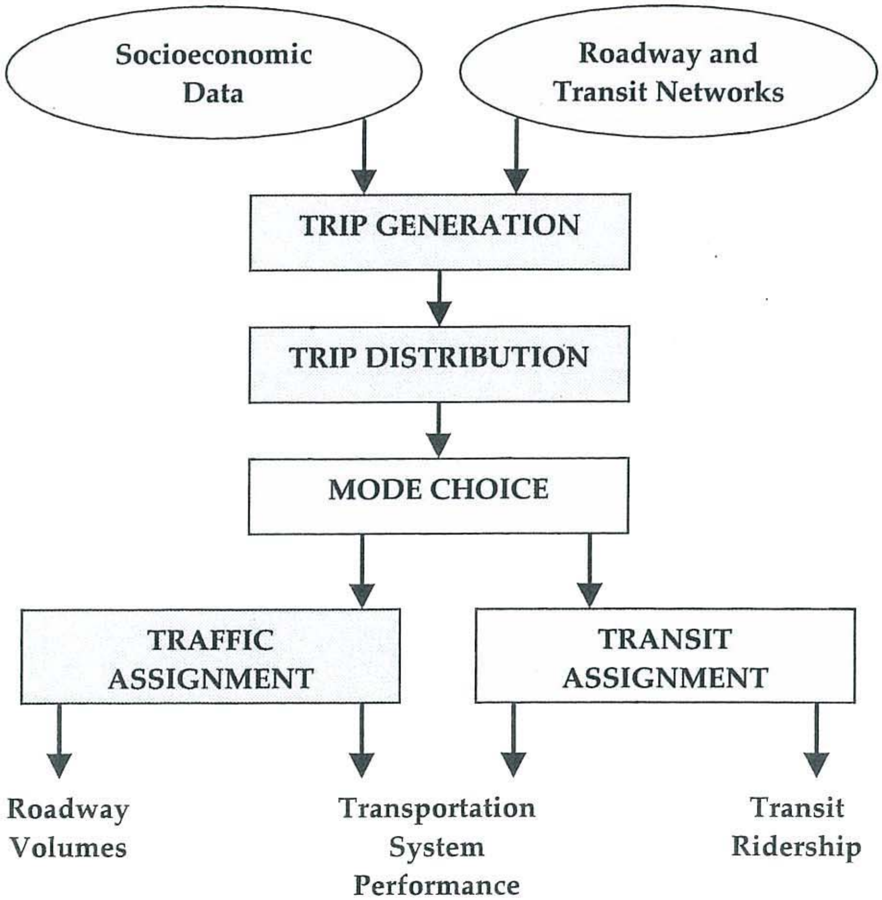


Exhibit 3-2

Multi-Modal Travel Model



The travel demand modeling process estimates trip-making behavior through a four-step process. Various socioeconomic scenarios and transportation alternatives can be forecasted by the model. Roadway traffic volumes, transit ridership, and system performance characteristics are produced by the model's application.

Exhibit 3-3

	Control Delay (seconds/vehicle)	
Level-of-Service	**Signalized Intersections**	**Unsignalized Intersections**
A	≤ 10	≤ 10
B	> 10 and ≤ 20	> 10 and ≤ 15
C	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
E	> 55 and ≤ 80	> 35 and ≤ 50
F	> 80	> 50

Note: The LOS criteria are based on control delay, which includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay.

Source: Transportation Research Board, Highway Capacity Manual, 2000, p. 16-2 for signalized intersections and p. 17-2 for unsignalized intersections.

Exhibit 3-4

WSDOT and City of Vancouver Intersection Standards				
Jurisdiction	**Method**	**Existing**	**No-Build**	**Build**
WSDOT[1]	n/a	n/a	n/a	n/a
City of Vancouver (signalized)[2]	LOS	E[3] / D[3]	E[3] / D[3]	E[3] / D[3]
City of Vancouver (unsignalized)[2]	LOS	E	E	E

Note 1: By legislation, WSDOT defers to regional and local agencies for standards

Note 2: Based on the 2003 Vancouver Concurrency Administration Manual

Note 3: Downtown Vancouver LOS Standard / Outside downtown Vancouver LOS Standard

Exhibit 3-5

ODOT and City of Portland Intersection Standards

Jurisdiction	Method	Existing	No-Build	Build
ODOT (ramp terminals)	V/C	0.85[1]	0.85[1]	0.75[2] / 0.85[1]
ODOT (street intersections)[3]	V/C	0.99	0.99	0.75 - 0.85[4] / 0.99[5]
City of Portland (signalized)[6]	LOS	D	D	D[7]
City of Portland (unsignalized)[6]	LOS	E	E	E[7]

Note 1: The standard stated in the Oregon Highway Plan (Action 1F1) applies to existing conditions, the No-Build alternative, and ramp terminals that remain unchanged from the No-Build in the LPA and LPA Phase I scenarios

Note 2: The standard stated in the Oregon Highway Design Manual (Table 10-1) applies to the LPA and LPA Phase I scenarios

Note 3: The standards stated in the Oregon Highway Design Manual (Table 7, 2004 update) applies to all scenarios

Note 4: Applies to new ODOT intersections that are not ramp terminals, and is dependant on roadway classification

Note 5: Applies to all intersections along Lombard Street and the intersection of MLK Jr. Boulevard and Columbia Boulevard

Note 6: Based on the Portland Transportation System Plan

Note 7: PDOT also considers Build scenarios to meet standards if they perform no worse than the No-Build

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4. Alternatives Performance Summary

This section presents highway and local street system transportation performance data and compares the data among the various alternatives. Highway performance data address I-5 and I-205 and compares travel demands, effects of congestion, traffic service volumes, travel times, and served versus unserved on-ramp volumes for each alternative. Local street performance data address travel demands across major roadways and intersection service levels for each alternative.

The three sections following this section provide detailed results and analysis of each of the following scenarios: 2005 existing conditions, No-Build Alternative, and the LPA. The LPA with highway phasing option is referred to as LPA Phase I in project exhibits.

4.1 I-5 and I-205 Performance

4.1.1 Daily Traffic Levels

Average daily traffic (ADT) volumes represent the average 24-hour weekday volume on a roadway segment**. Exhibit 4-1** summarizes ADT volumes on the I-5 bridge, the I-205 bridge, and the total river crossing.

4.1.2 Travel Demand

Exhibits 4-2 through **4-5** summarize existing 2005 and forecast 2030 I-5 travel demand. The four-hour peak period travel demands are shown by direction by alternative for the entire 23-mile corridor from the Marquam Bridge in Portland, Oregon to the Pioneer Street interchange in Ridgefield, Washington. There is little or no difference in travel demand between the LPA with highway phasing option and the LPA scenarios because the differences in the highway and ramp configurations between the two options do not affect travel demand in the corridor.

Existing and forecast 2030 I-205 travel demands are summarized in **Exhibits 4-6** through **4-9**. The two-hour peak period travel demands are summarized by direction by alternative for the nine-mile corridor from the I-84 interchange in Portland, Oregon to the SR 500 interchange in Vancouver, Washington.

4.1.3 Effect of Congestion

Existing and forecast 2030 I-5 southbound and northbound daily hours of congestion are shown in **Exhibits 4-10** and **4-11**, respectively. The numbers of hours during which speeds are less than 30 mph have been summarized for each alternative between 5 a.m. and 9 p.m.

4.1.4 Travel Times

Existing 2005 and forecast 2030 southbound I-5 travel times during the two-hour morning peak are summarized for SR 500 to Columbia Boulevard and 179th Street to I-84 in **Exhibit 4-12**. The travel times are summarized for travel time segments by alternative. **Exhibit 4-13** summarizes northbound travel times for Columbia Boulevard to SR 500 and I-84 to 179th Street for the two-hour afternoon/evening peak. The travel times are summarized for both travel time segments by alternative. Additionally, travel times were computed to account for the time it would take to access I-5 southbound from SR 500, Mill Plain and SR 14.

Existing 2005 and forecast 2030 southbound I-205 travel times during the two-hour morning peak are summarized for three segments by alternative in **Exhibit 4-14**. The three travel time segments reported include SR 500 to bridge mid-point, bridge mid-point to I-84, and the combined segment from SR 500 to I-84. Measuring travel times from highway to highway, or to the mid-point on bridge is done for comparative purposes only. In reality, vehicle trips begin and end at origins and destination, not on a highway. **Exhibit 4-15** summarizes northbound travel times for the two-hour afternoon/evening peak by alternative. The three travel time segments reported include I-84 to bridge mid-point, bridge mid-point to SR 500, and the combined segment from I-84 to SR 500.

4.1.5 Service Volumes

Service volumes refer to the total number of vehicles that are actually able to travel through a transportation facility. Existing 2005 and forecast 2030 I-5 service volumes across the I-5 bridge are summarized in **Exhibit 4-16**. The four-hour peak service volumes are summarized by direction by alternative. Existing 2005 and forecast 2030 I-205 service volumes across the I-205 bridge are summarized in **Exhibit 4-17**. The two-hour peak service volumes are summarized by direction by alternative. Similarly, four-hour peak I-5 truck service volumes across the Interstate Bridge are summarized by direction and by alternative in **Exhibit 4-18**.

4.1.6 Served vs. Unserved Ramp Volumes

Served ramp volumes refer to on-ramp vehicle demands that have been able to be accommodated by the highway mainline during the four-hour peaks. Unserved ramp volumes are those vehicle demands that are not able to enter the highway mainline because of congestion or other reasons.

Existing 2005 and forecast 2030 southbound morning peak served versus unserved ramp volumes are summarized within the Bridge Influence Area in **Exhibit 4-19**. The volumes are summarized by ramp by alternative. **Exhibit 4-20** summarizes northbound served versus unserved ramp volumes within the Bridge Influence Area by ramp by alternative.

4.1.7 Person Throughput

Person throughput is defined as the total number of persons crossing a defined point in space for a stated time period, regardless of travel mode. **Exhibit 4-21** shows peak northbound and southbound person throughput across the I-5 bridge.

4.2 Local Street Performance

4.2.1 Travel Demand

Screenlines are part of a traffic analysis method used to examine local street operations. This technique measures entering and exiting traffic volumes across key north-south and east-west screenlines. Comparison of screenline volumes across different models yields information regarding the performance of local streets, especially when examined in conjunction with intersection LOS calculations.

For Vancouver, four screenlines were chosen to represent traffic moving north and south through the city, and three screenlines were selected to measure east and west travel. Vancouver screenline locations are shown in **Exhibit 4-22**.

For Portland, three screenlines were chosen to represent traffic moving north and south through the city, and three screenlines were selected to measure east and west travel. Portland screenline locations are shown in **Exhibit 4-23**.

Exhibits 4-24 and **4-25** display the screenline results for the morning and afternoon/evening peaks in Vancouver. The north-south screenline table summarizes the eastbound and westbound volume data and the east-west screenline table summarizes the southbound and northbound volume data. Volumes are rounded to the nearest 50 vehicles.

Exhibits 4-26 and **4-27** display the screenline results for the morning and afternoon/evening peaks in Portland. The north-south screenline table summarizes the eastbound and westbound volume data and the east-west screenline table summarizes the southbound and northbound volume data. Volumes are rounded to the nearest 50 vehicles.

4.2.2 Intersection Service Levels

Exhibits 4-28 and **4-29** display the results of the Synchro/SimTraffic analyses conducted in Vancouver for the morning and afternoon/evening peaks. For signalized intersections, results are presented for the overall intersection. For unsignalized intersections, data is given for the movement that experiences the most delay. In addition to the average delay, the tables present the corresponding LOS, the ICU or V/C of the intersection, the relevant standard for comparison, and a list of movements that exceed the available storage length, if applicable.

Exhibits 4-30 and **4-31** display the results of the Synchro/SimTraffic analyses conducted in Portland for the morning and afternoon/evening peaks. For signalized intersections, results are presented for the overall intersection. For unsignalized intersections, data is given for the movement that experiences the most delay. In addition to the average delay, the tables present the corresponding LOS, the ICU or V/C of the intersection, the relevant standard for comparison, and a list of movements that exceed the available storage length, if applicable.

4.3 Effect of Tolling

4.3.1 Service Volumes

Exhibit 4-32 summarizes the daily service volumes for I-5, I-205, and the total river crossing under different tolling scenarios. More information on tolling scenarios, tolling rate structures and highway performance for each tolling scenario can be found in **Chapter 8**.

Exhibit 4-1

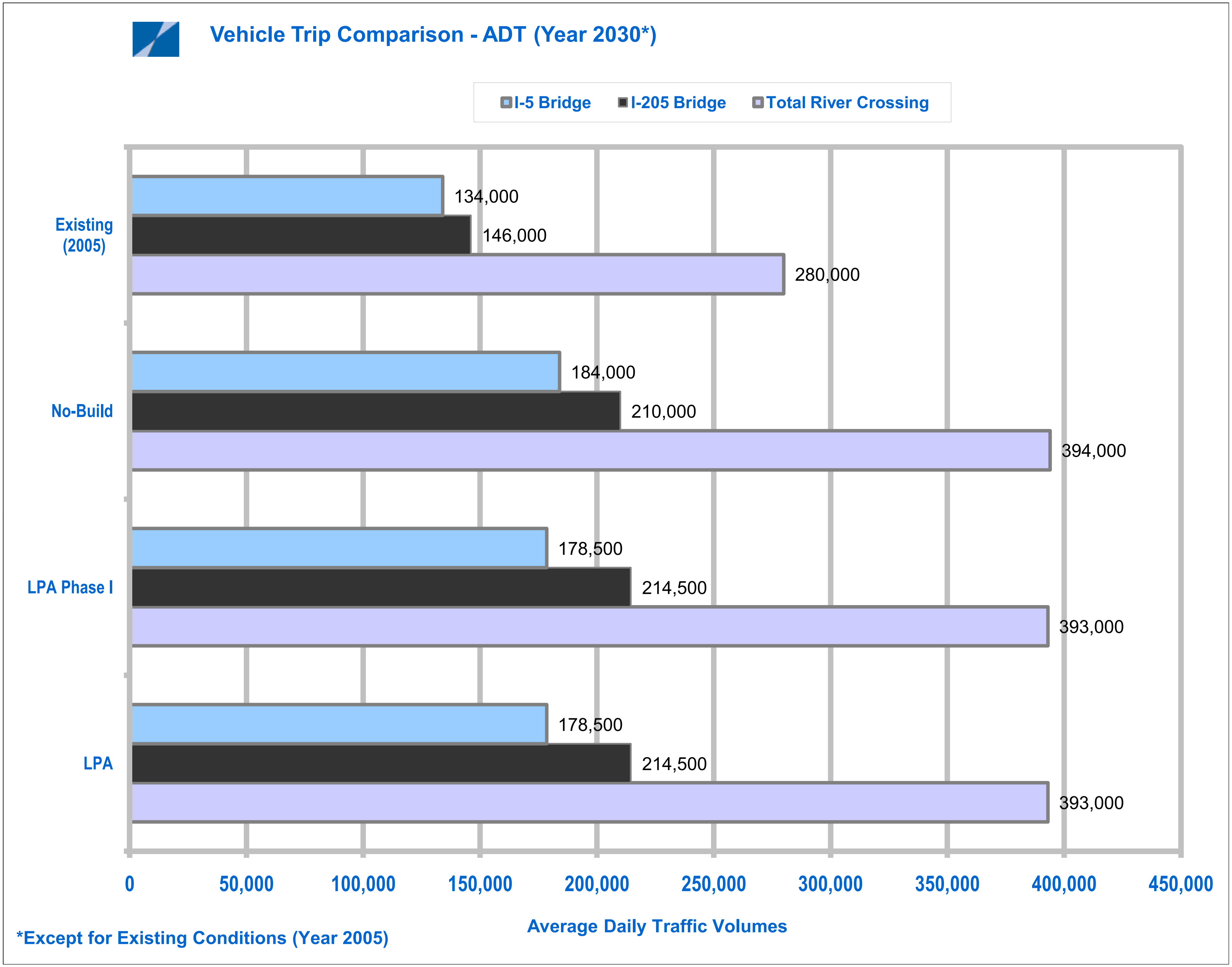
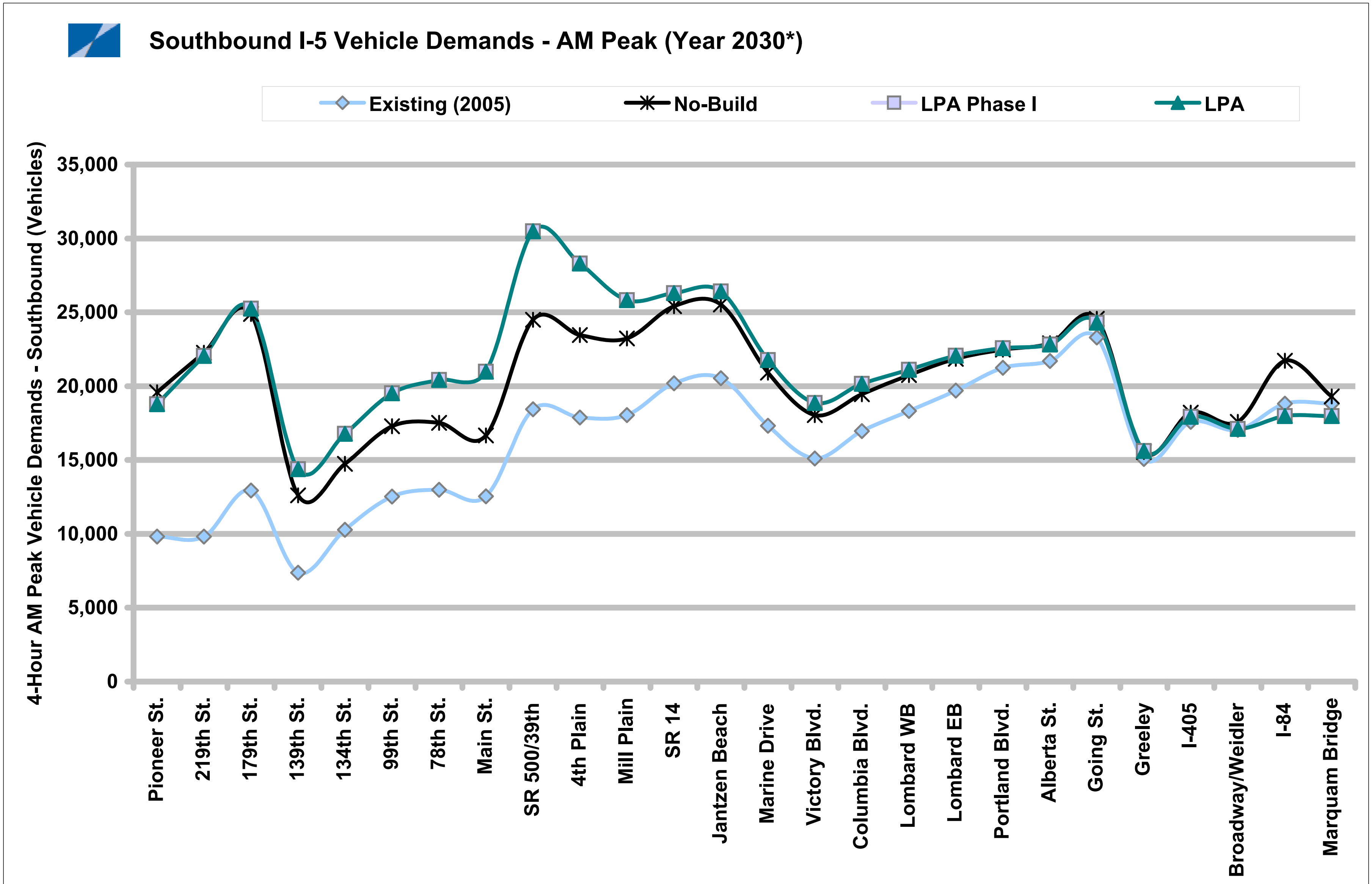
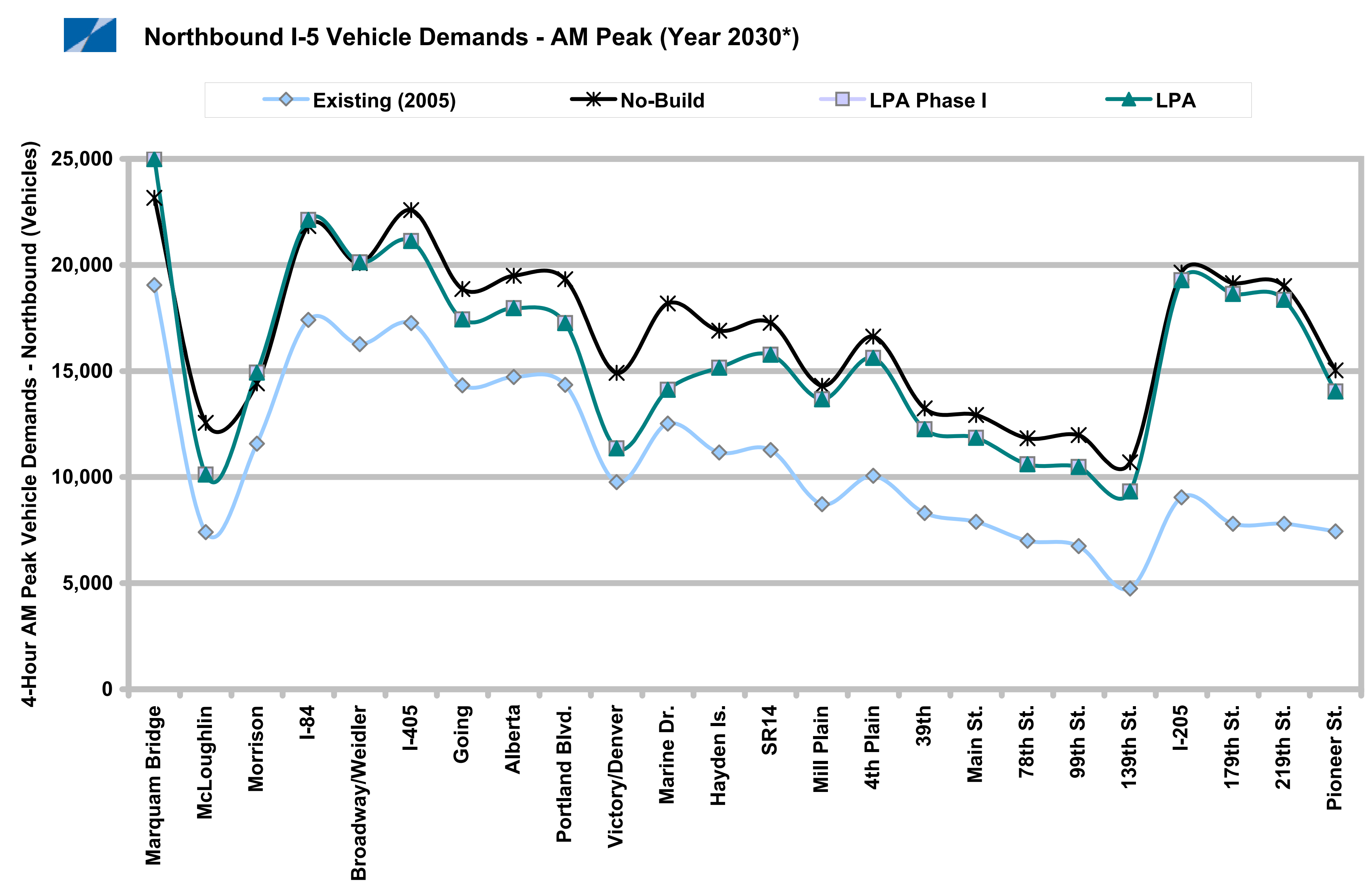

Vehicle Trip Comparison - ADT (Year 2030*)
I-5 Bridge
I-205 Bridge
Total River Crossing
Existing (2005)
No-Build
LPA Phase I
LPA
134,000
146,000
280,000
184,000
210,000
394,000
178,500
214,500
393,000
178,500
214,500
393,000
0
50,000
100,000
150,000
200,000
250,000
300,000
350,000
400,000
450,000
Average Daily Traffic Volumes
*Except for Existing Conditions (Year 2005)

Exhibit 4-2



*Except for Existing Conditions (Year 2005)

Exhibit 4-3



*Except for Existing Conditions (Year 2005)

Exhibit 4-4

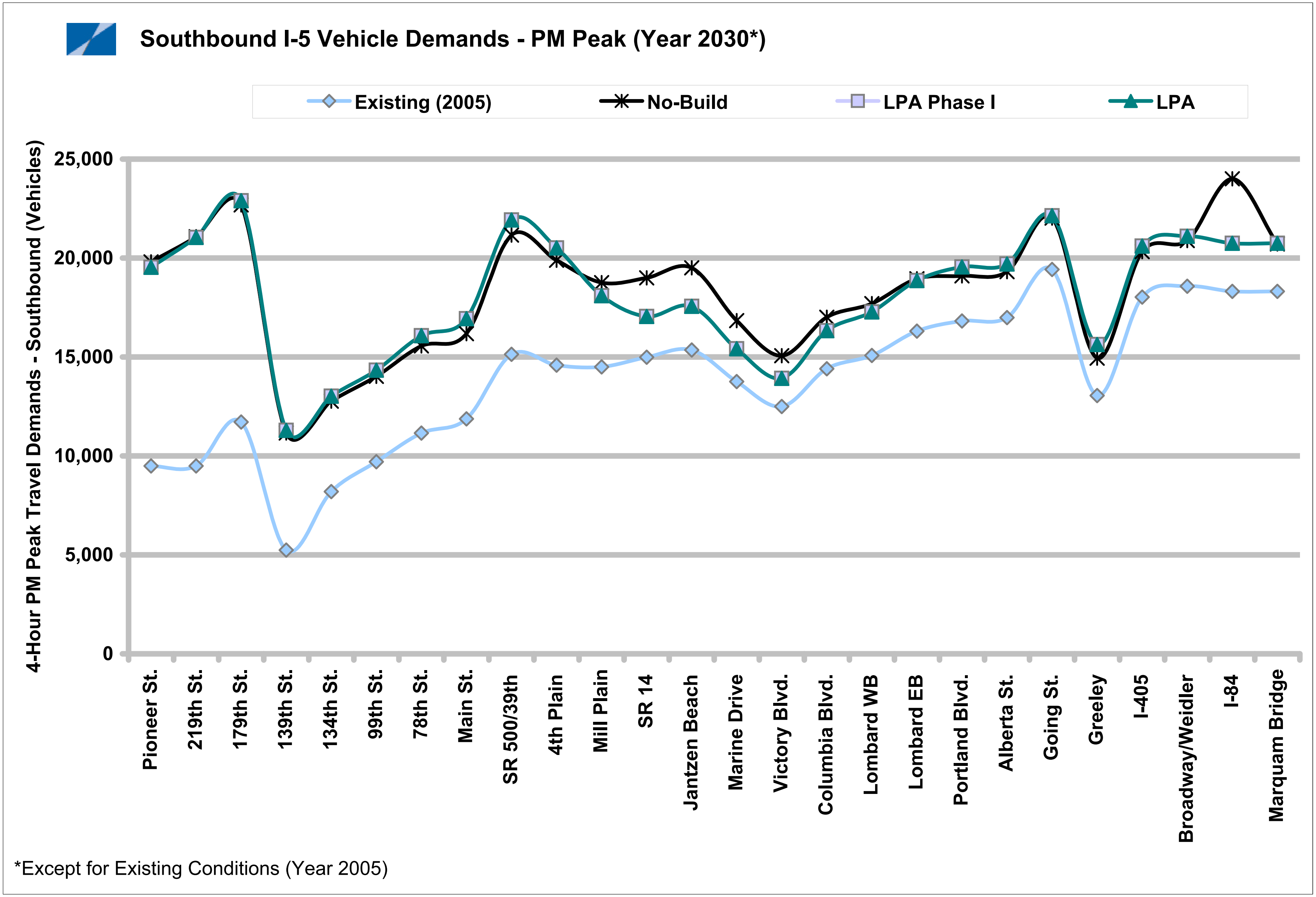
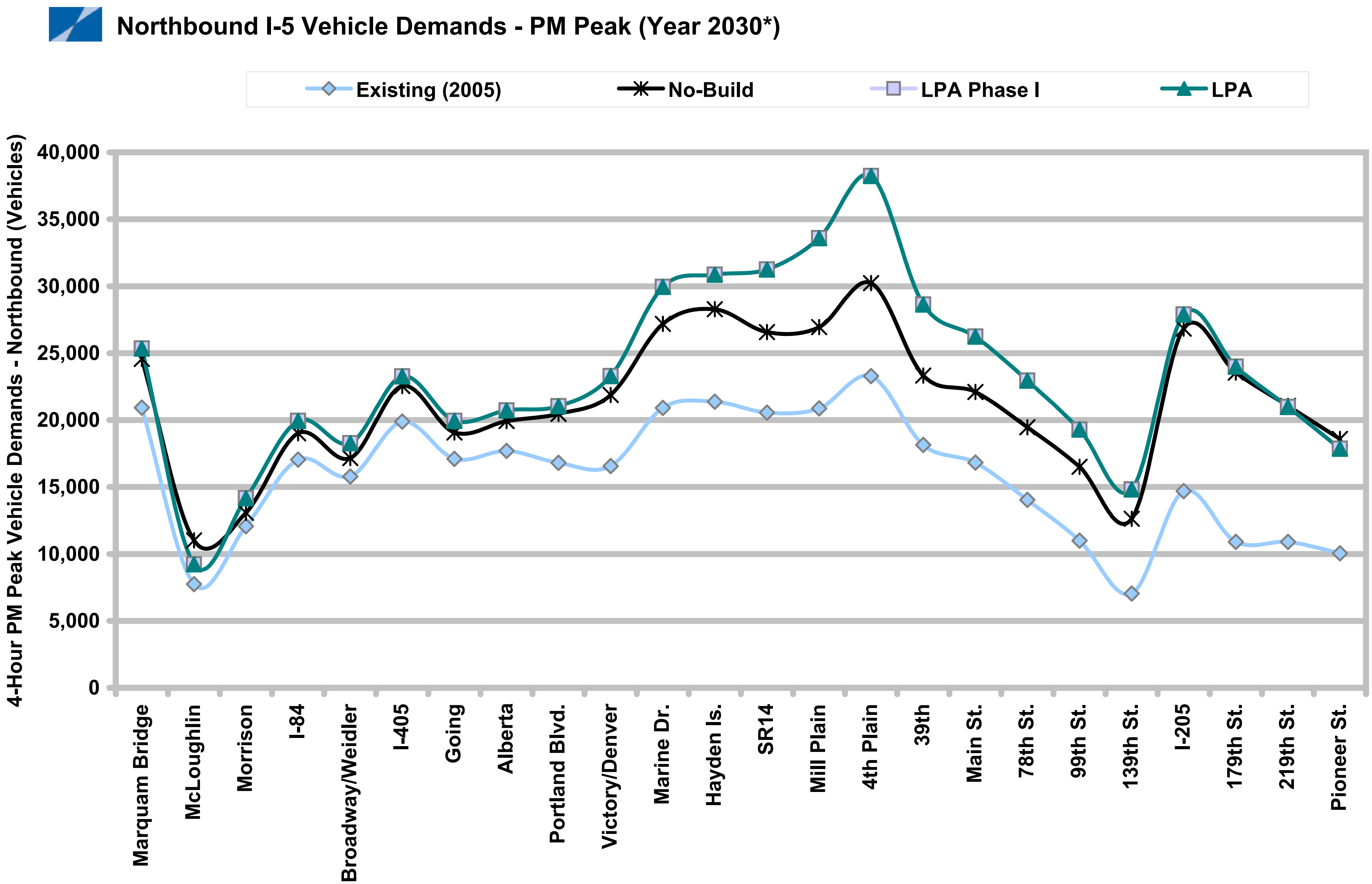
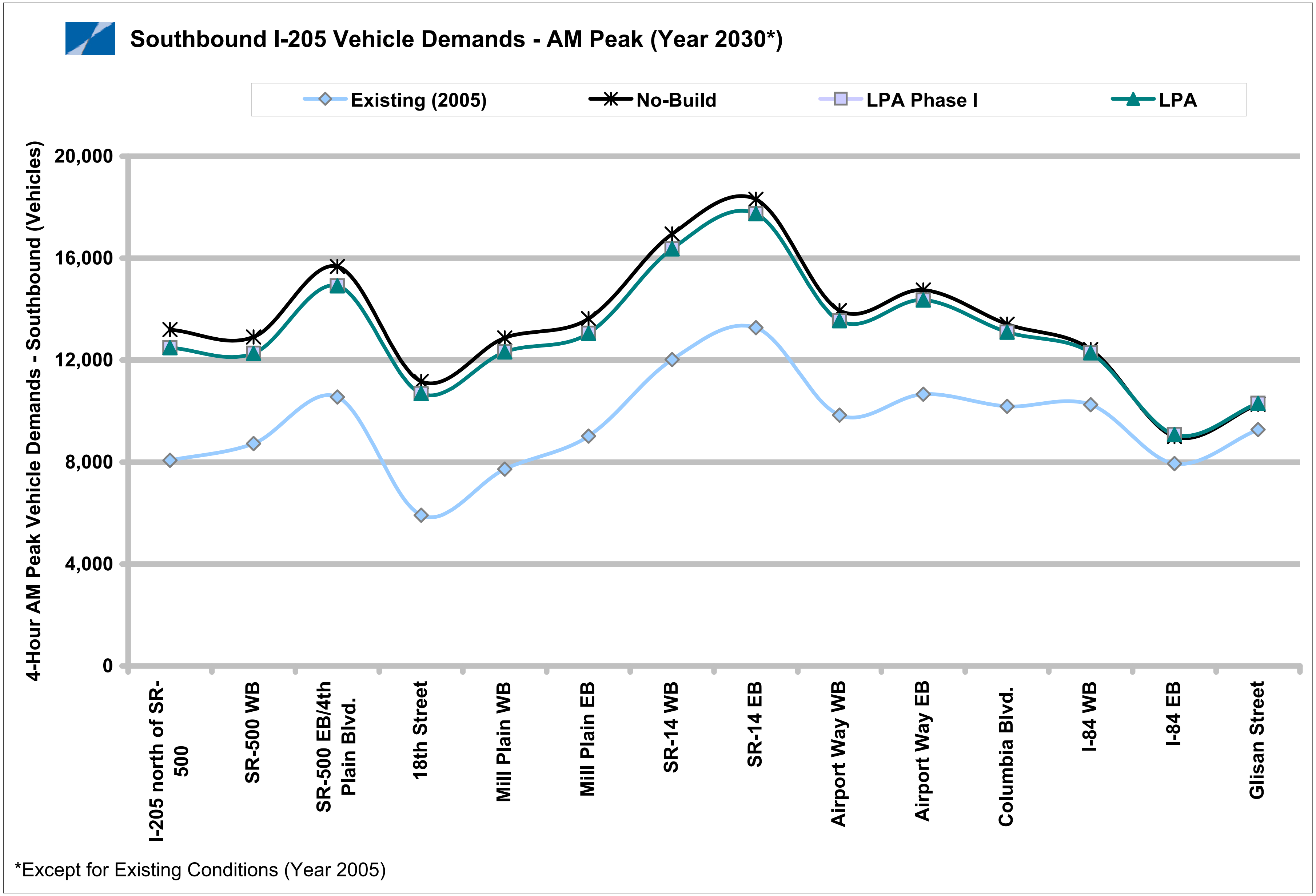

Southbound I-5 Vehicle Demands - PM Peak (Year 2030*)
Existing (2005)
No-Build
LPA Phase I
LPA
4-Hour PM Peak Travel Demands - Southbound (Vehicles)
25,000
20,000
15,000
10,000
5,000
0
Pioneer St.
219th St.
179th St.
139th St.
134th St.
99th St.
78th St.
Main St.
SR 500/39th
4th Plain
Mill Plain
SR 14
Jantzen Beach
Marine Drive
Victory Blvd.
Columbia Blvd.
Lombard WB
Lombard EB
Portland Blvd.
Alberta St.
Going St.
Greeley
I-405
Broadway/Weidler
I-84
Marquam Bridge
*Except for Existing Conditions (Year 2005)

Exhibit 4-5



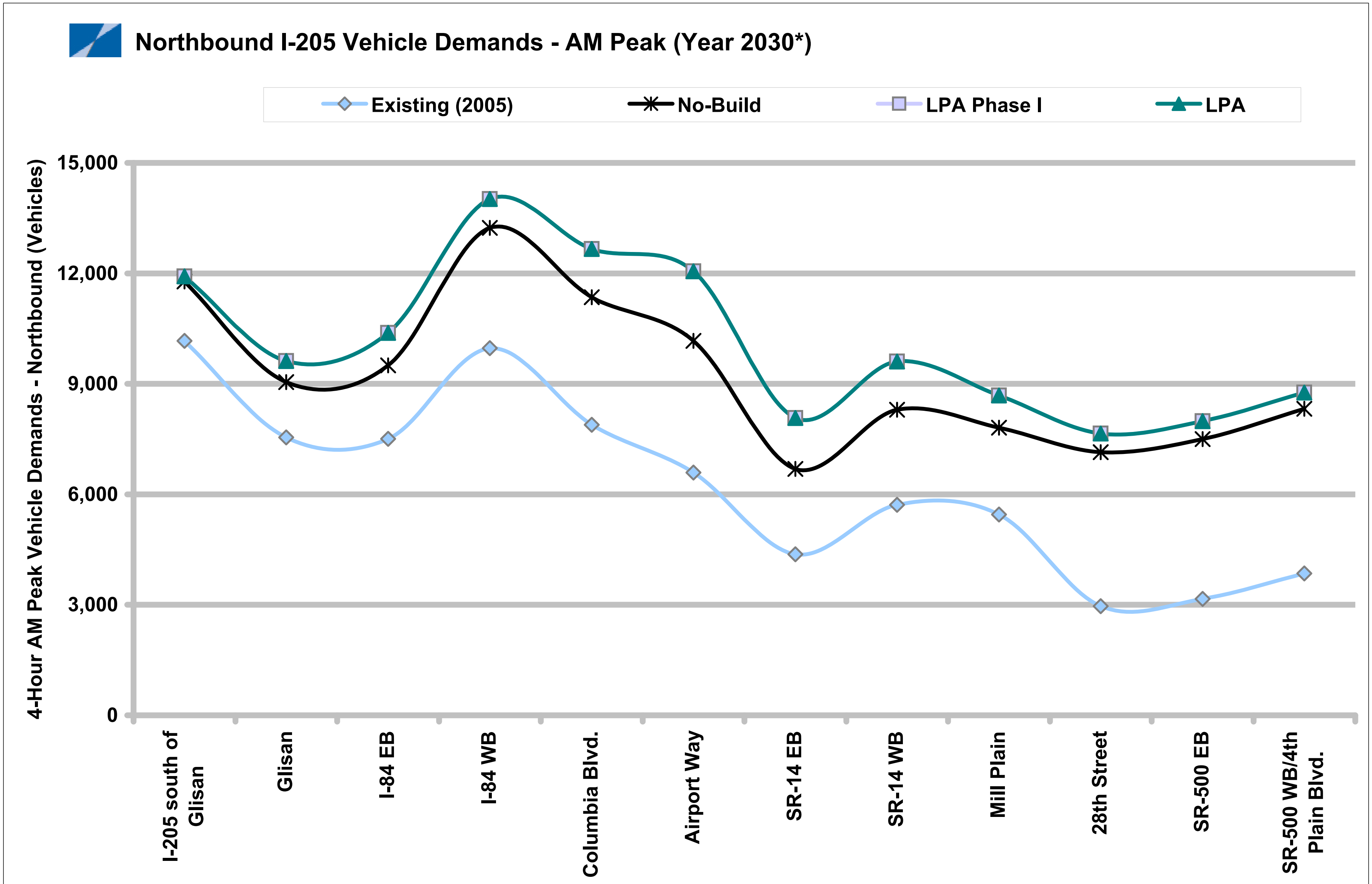
*Except for Existing Conditions (Year 2005)

Exhibit 4-6



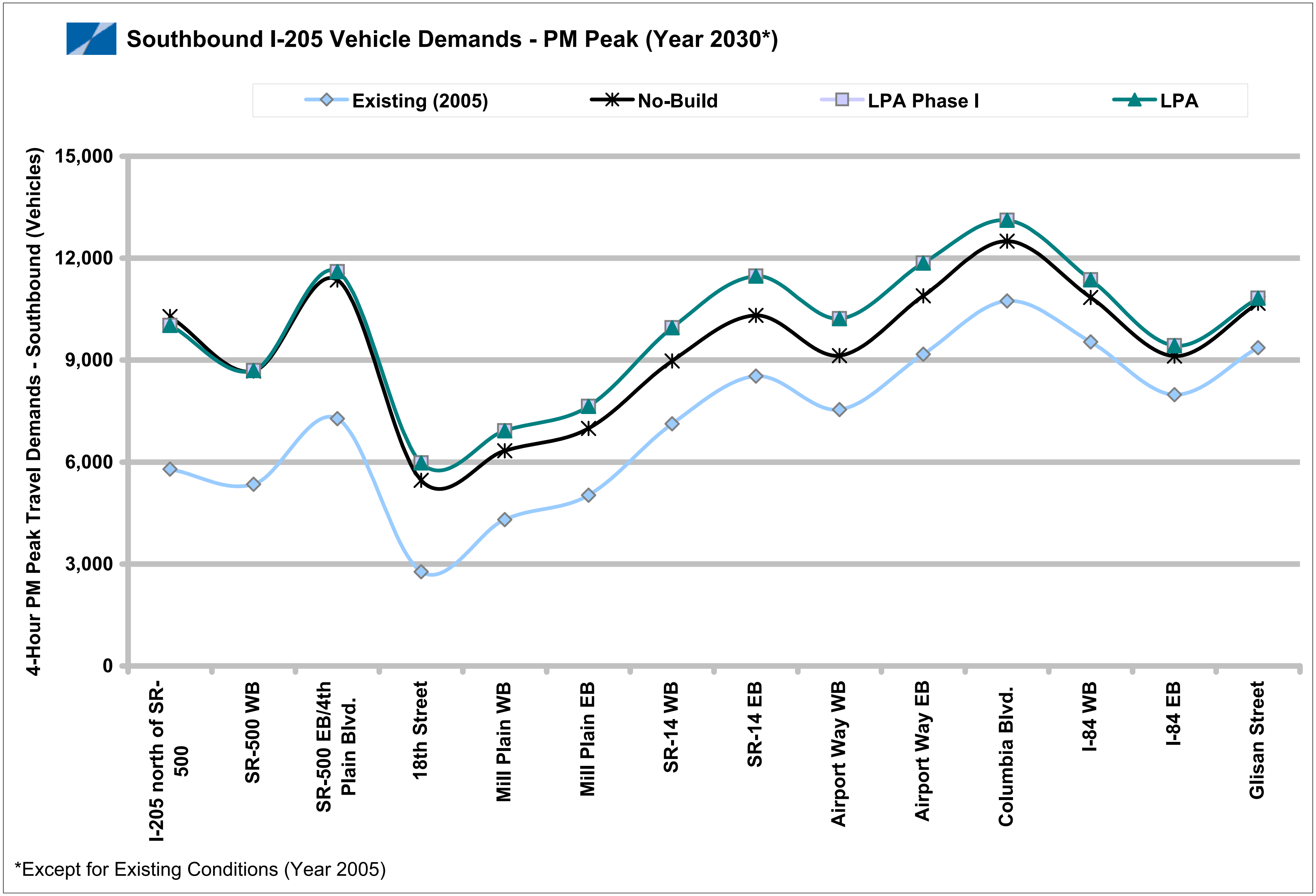
Southbound I-205 Vehicle Demands - AM Peak (Year 2030*)
Existing (2005)
No-Build
LPA Phase I
LPA
4-Hour AM Peak Vehicle Demands - Southbound (Vehicles)
20,000
16,000
12,000
8,000
4,000
0
I-205 north of SR-500
SR-500 WB
SR-500 EB/4th Plain Blvd.
18th Street
Mill Plain WB
Mill Plain EB
SR-14 WB
SR-14 EB
Airport Way WB
Airport Way EB
Columbia Blvd.
I-84 WB
I-84 EB
Glisan Street
*Except for Existing Conditions (Year 2005)

Exhibit 4-7



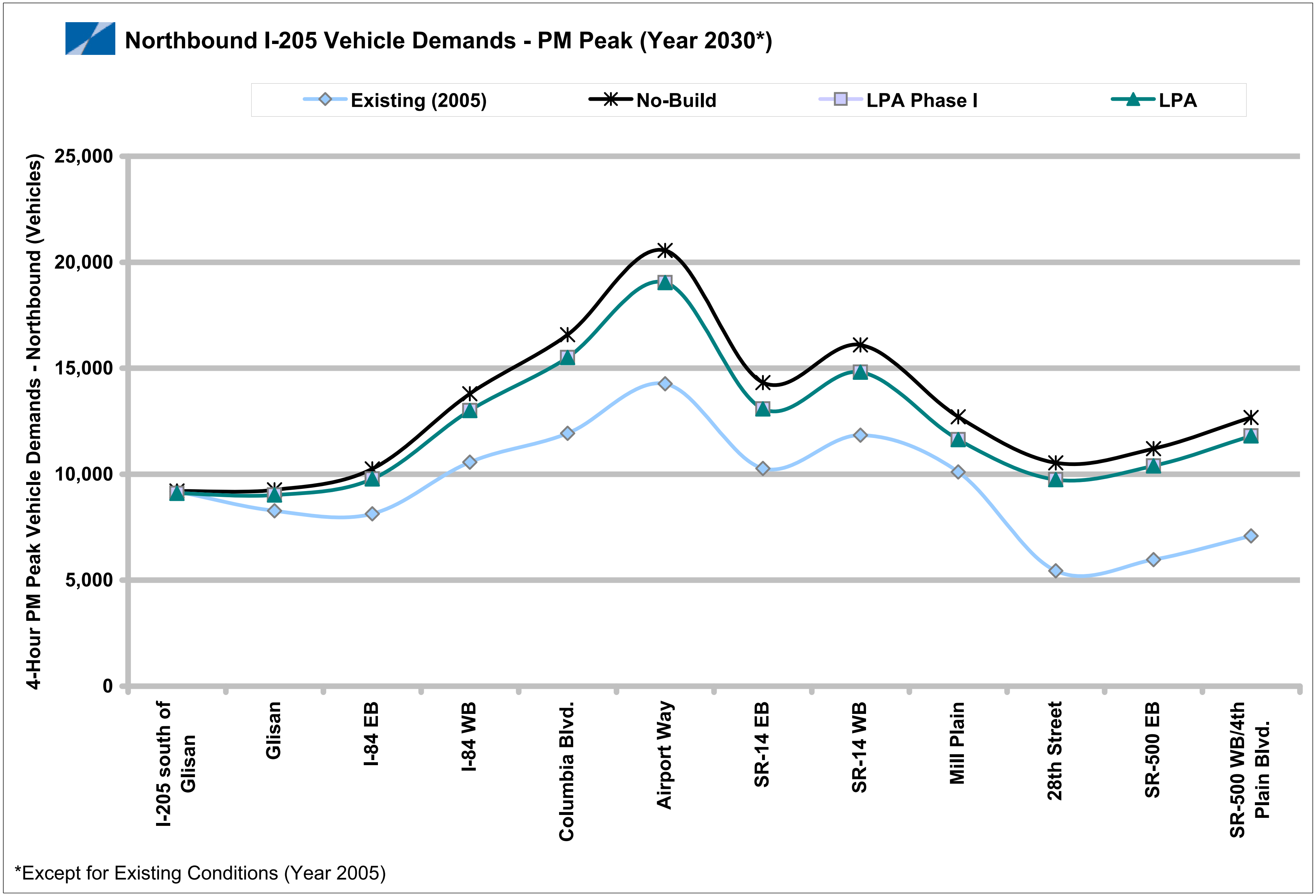
*Except for Existing Conditions (Year 2005)

Exhibit 4-8



Southbound I-205 Vehicle Demands - PM Peak (Year 2030*)
Existing (2005)
No-Build
LPA Phase I
LPA
4-Hour PM Peak Travel Demands - Southbound (Vehicles)
15,000
12,000
9,000
6,000
3,000
0
I-205 north of SR-500
SR-500 WB
SR-500 EB/4th Plain Blvd.
18th Street
Mill Plain WB
Mill Plain EB
SR-14 WB
SR-14 EB
Airport Way WB
Airport Way EB
Columbia Blvd.
I-84 WB
I-84 EB
Glisan Street
*Except for Existing Conditions (Year 2005)

Exhibit 4-9



Northbound I-205 Vehicle Demands - PM Peak (Year 2030*)
Existing (2005)
No-Build
LPA Phase I
LPA
4-Hour PM Peak Vehicle Demands - Northbound (Vehicles)
25,000
20,000
15,000
10,000
5,000
0
I-205 south of Glisan
Glisan
I-84 EB
I-84 WB
Columbia Blvd.
Airport Way
SR-14 EB
SR-14 WB
Mill Plain
28th Street
SR-500 EB
SR-500 WB/4th Plain Blvd.
*Except for Existing Conditions (Year 2005)

Exhibit 4-10

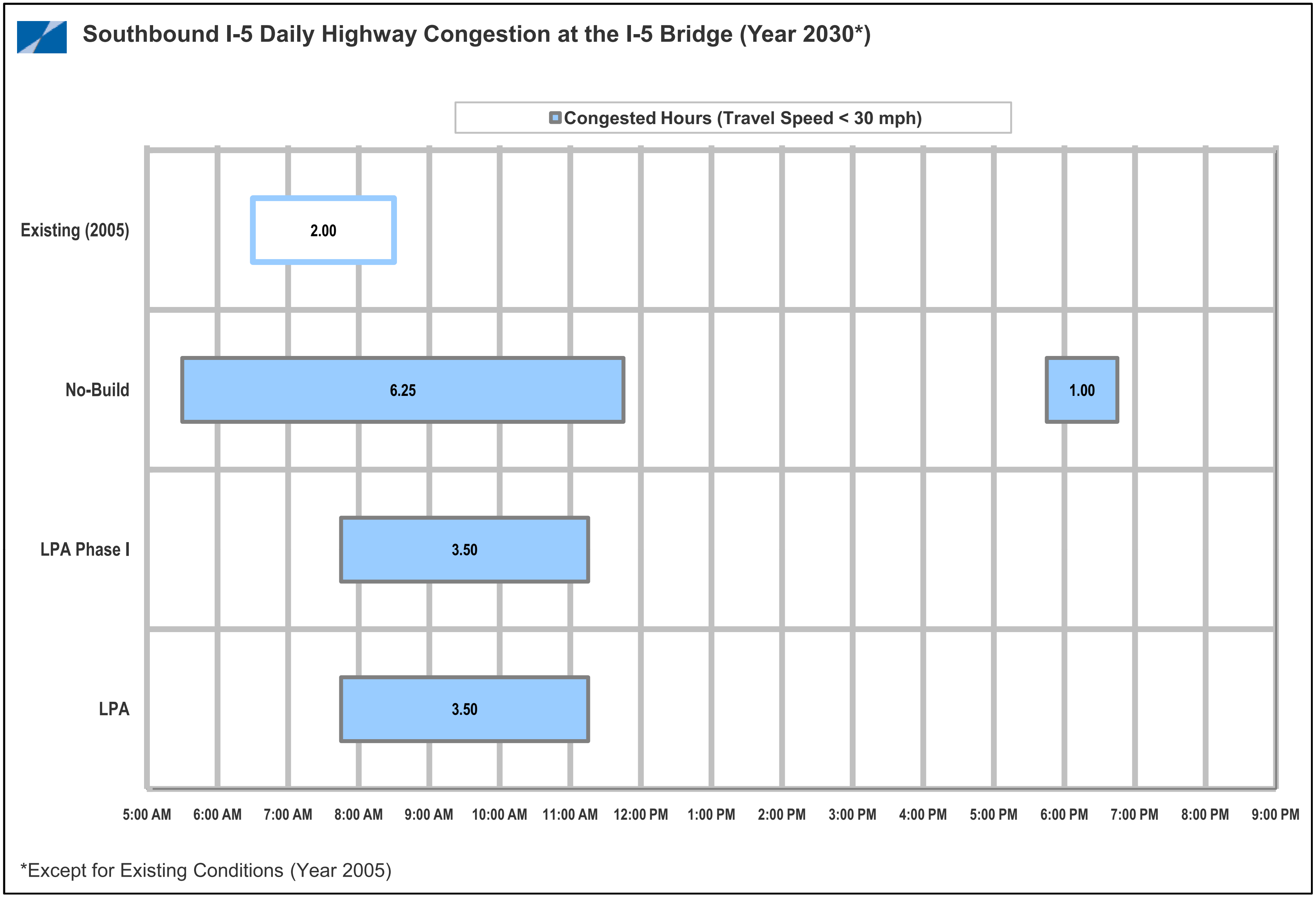
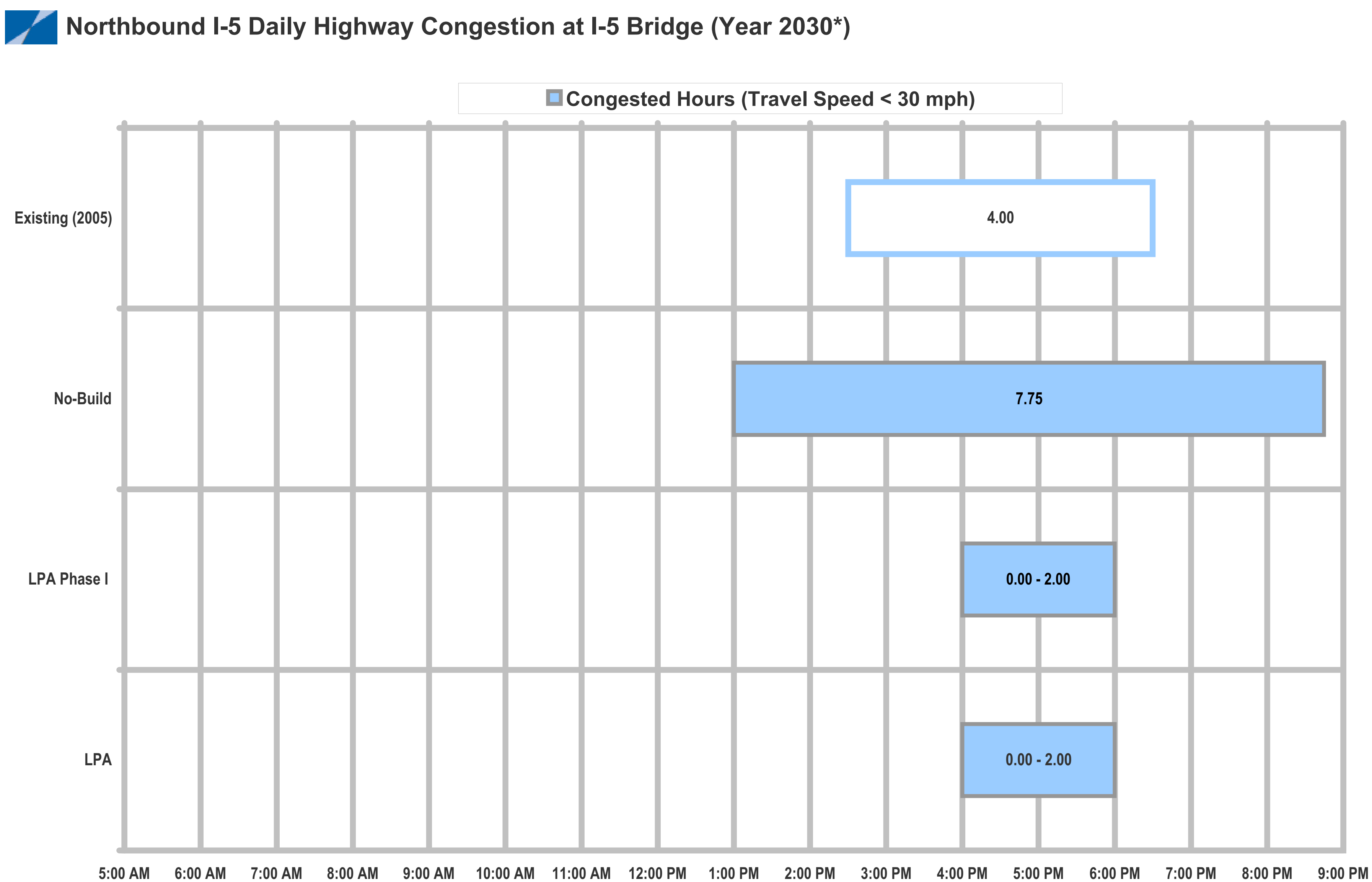

Southbound I-5 Daily Highway Congestion at the I-5 Bridge (Year 2030*)
Congested Hours (Travel Speed < 30 mph)
Existing (2005)
No-Build
LPA Phase I
LPA
2.00
6.25
1.00
3.50
3.50
5:00 AM
6:00 AM
7:00 AM
8:00 AM
9:00 AM
10:00 AM
11:00 AM
12:00 PM
1:00 PM
2:00 PM
3:00 PM
4:00 PM
5:00 PM
6:00 PM
7:00 PM
8:00 PM
9:00 PM
*Except for Existing Conditions (Year 2005)

Exhibit 4-11



*Except for Existing Conditions (Year 2005)

Exhibit 4-12

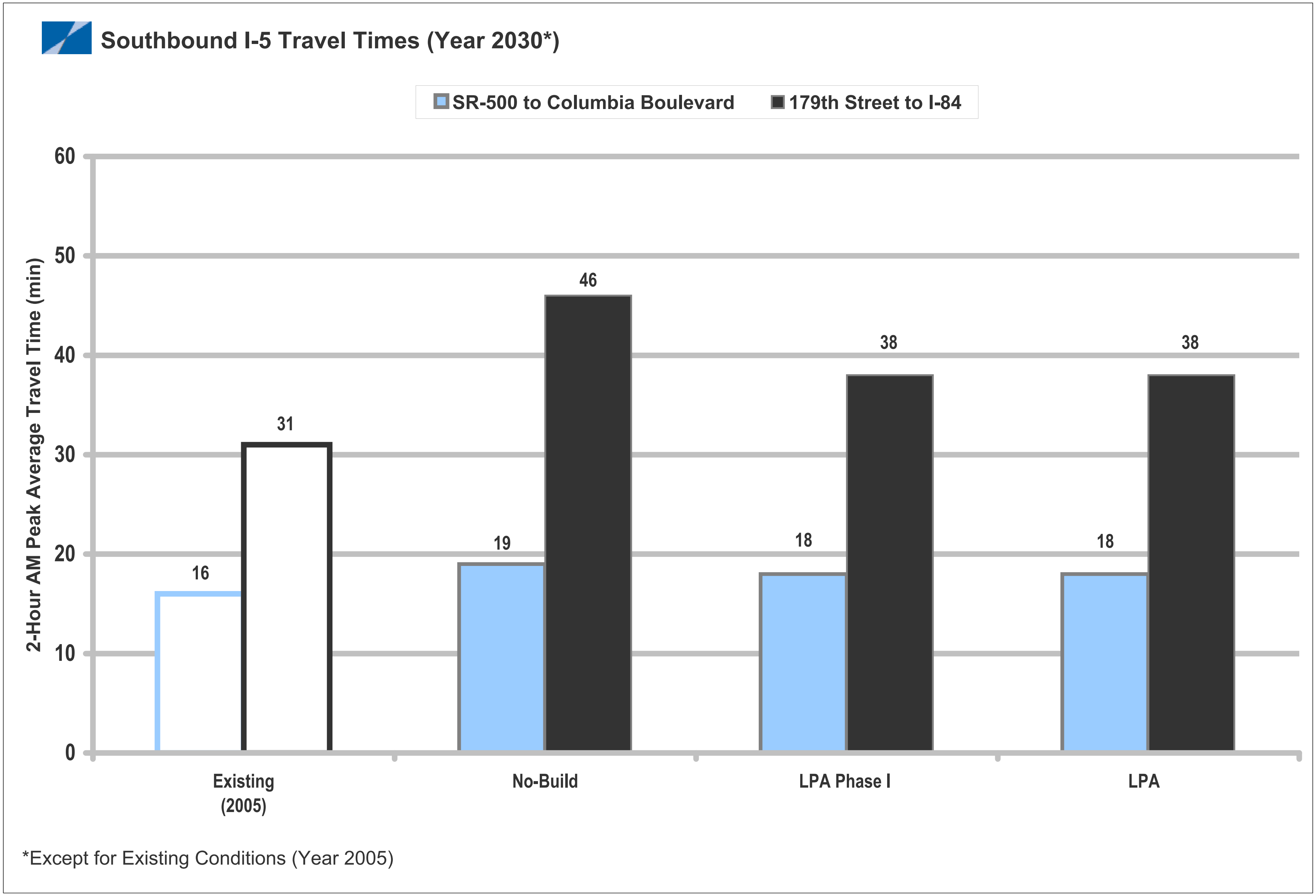
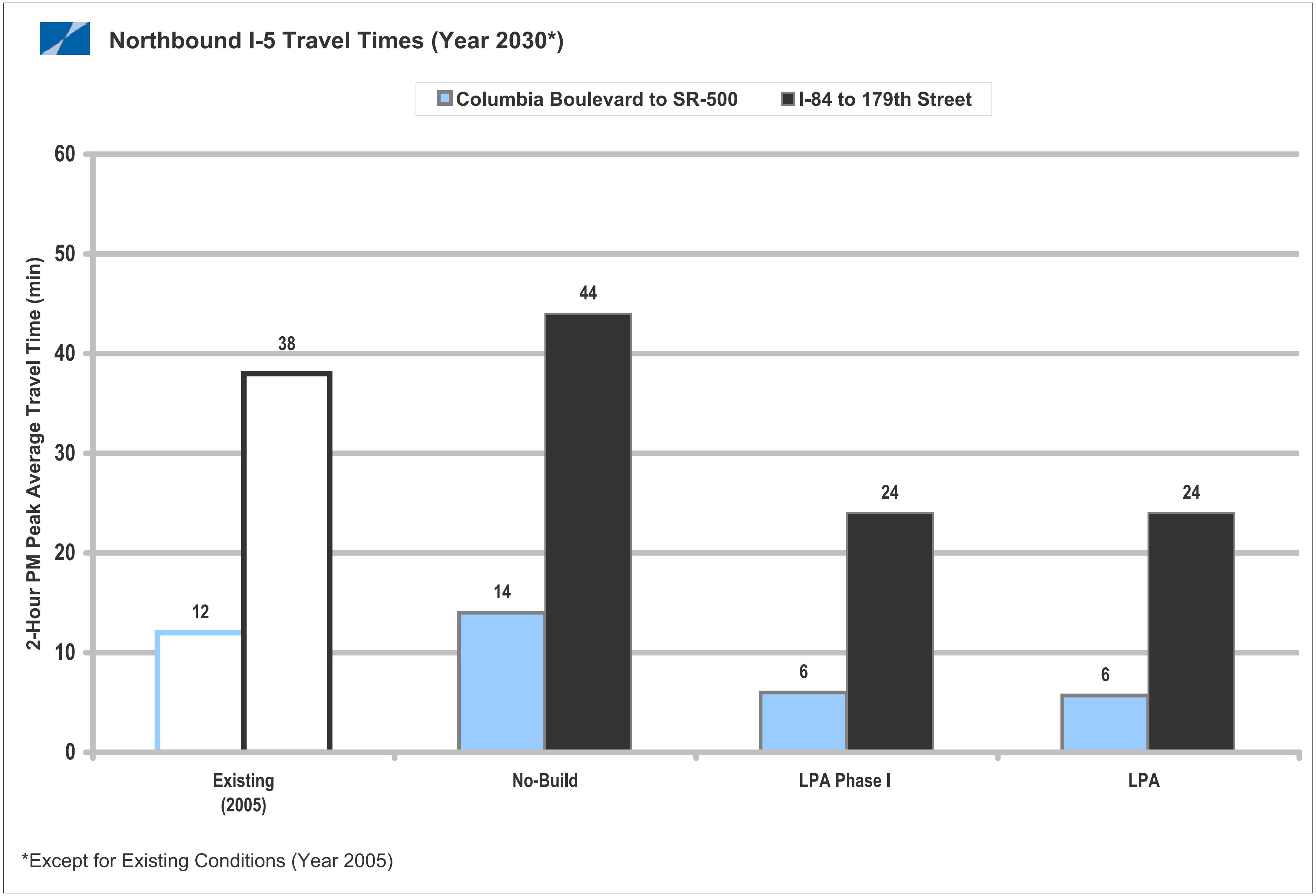
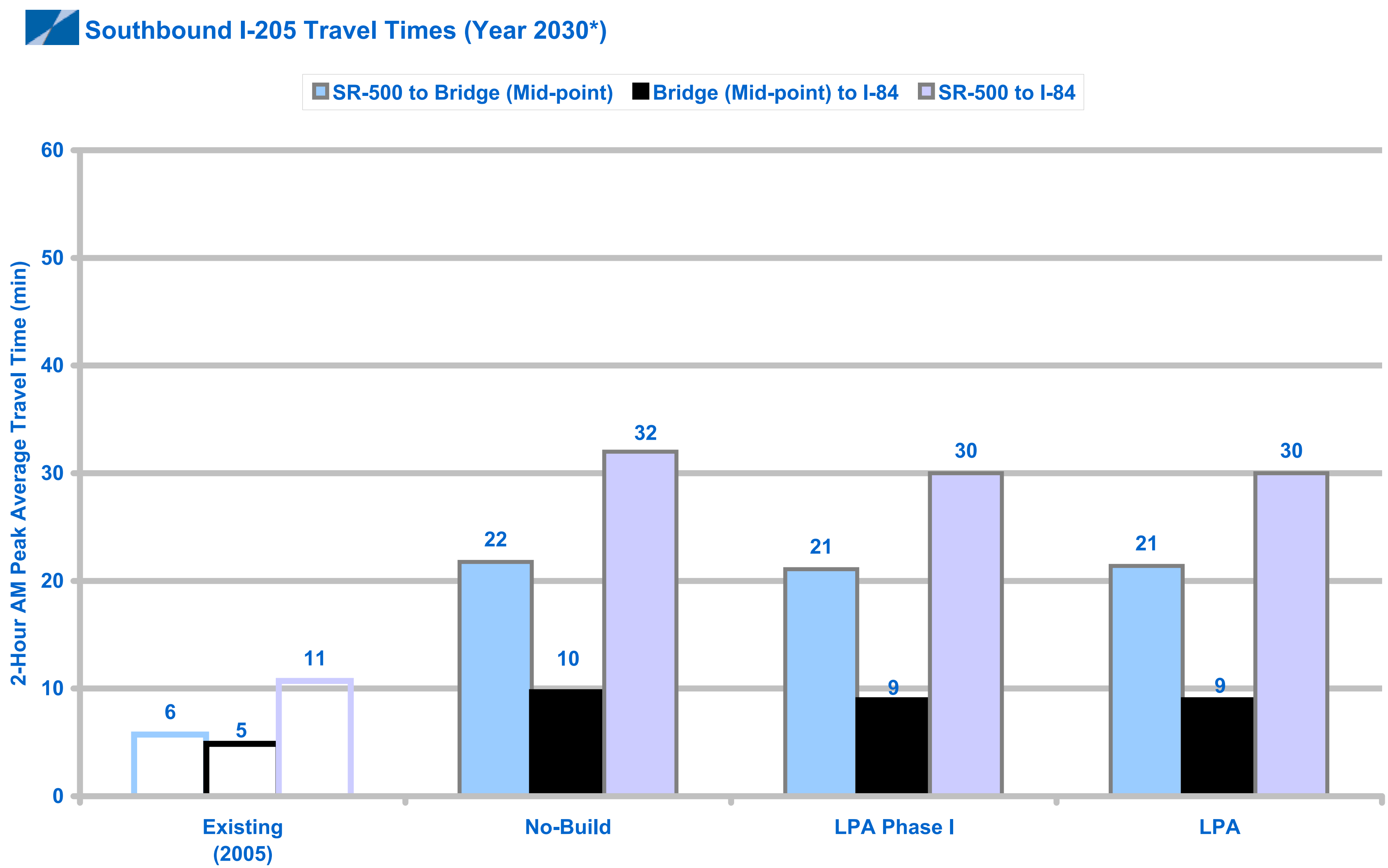

Southbound I-5 Travel Times (Year 2030*)
SR-500 to Columbia Boulevard
179th Street to I-84
2-Hour AM Peak Average Travel Time (min)
60
50
40
30
20
10
0
16
31
19
46
18
38
18
38
Existing (2005)
No-Build
LPA Phase I
LPA
*Except for Existing Conditions (Year 2005)

Exhibit 4-13



Northbound I-5 Travel Times (Year 2030*)
Columbia Boulevard to SR-500
I-84 to 179th Street
2-Hour PM Peak Average Travel Time (min)
60
50
40
30
20
10
0
12
38
14
44
6
24
6
24
Existing (2005)
No-Build
LPA Phase I
LPA
*Except for Existing Conditions (Year 2005)

Exhibit 4-14



*Except for Existing Conditions (Year 2005)

Exhibit 4-15

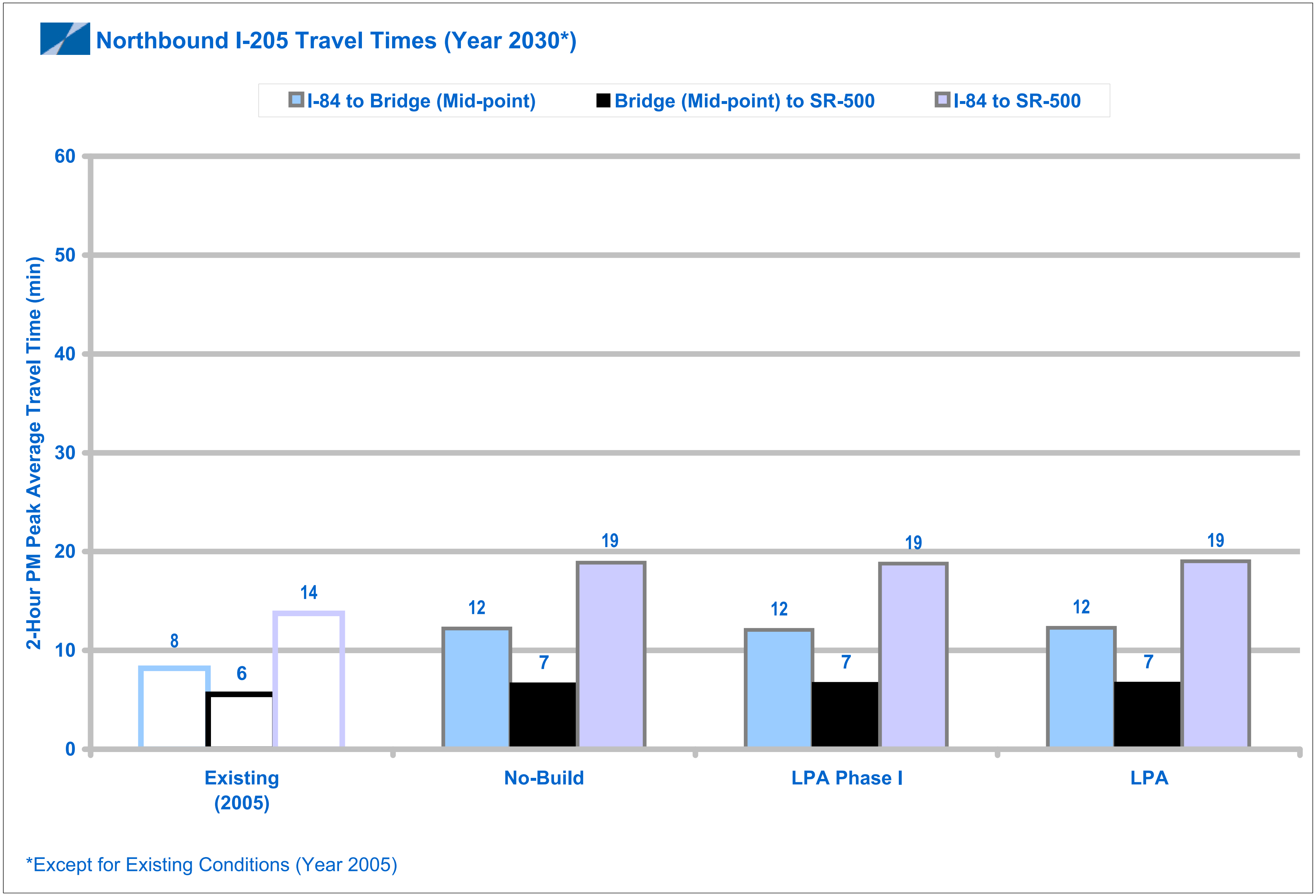

Northbound I-205 Travel Times (Year 2030*)
I-84 to Bridge (Mid-point)
Bridge (Mid-point) to SR-500
I-84 to SR-500
2-Hour PM Peak Average Travel Time (min)
60
50
40
30
20
10
0
8
6
14
12
7
19
12
7
19
12
7
19
Existing (2005)
No-Build
LPA Phase I
LPA
*Except for Existing Conditions (Year 2005)

Exhibit 4-16

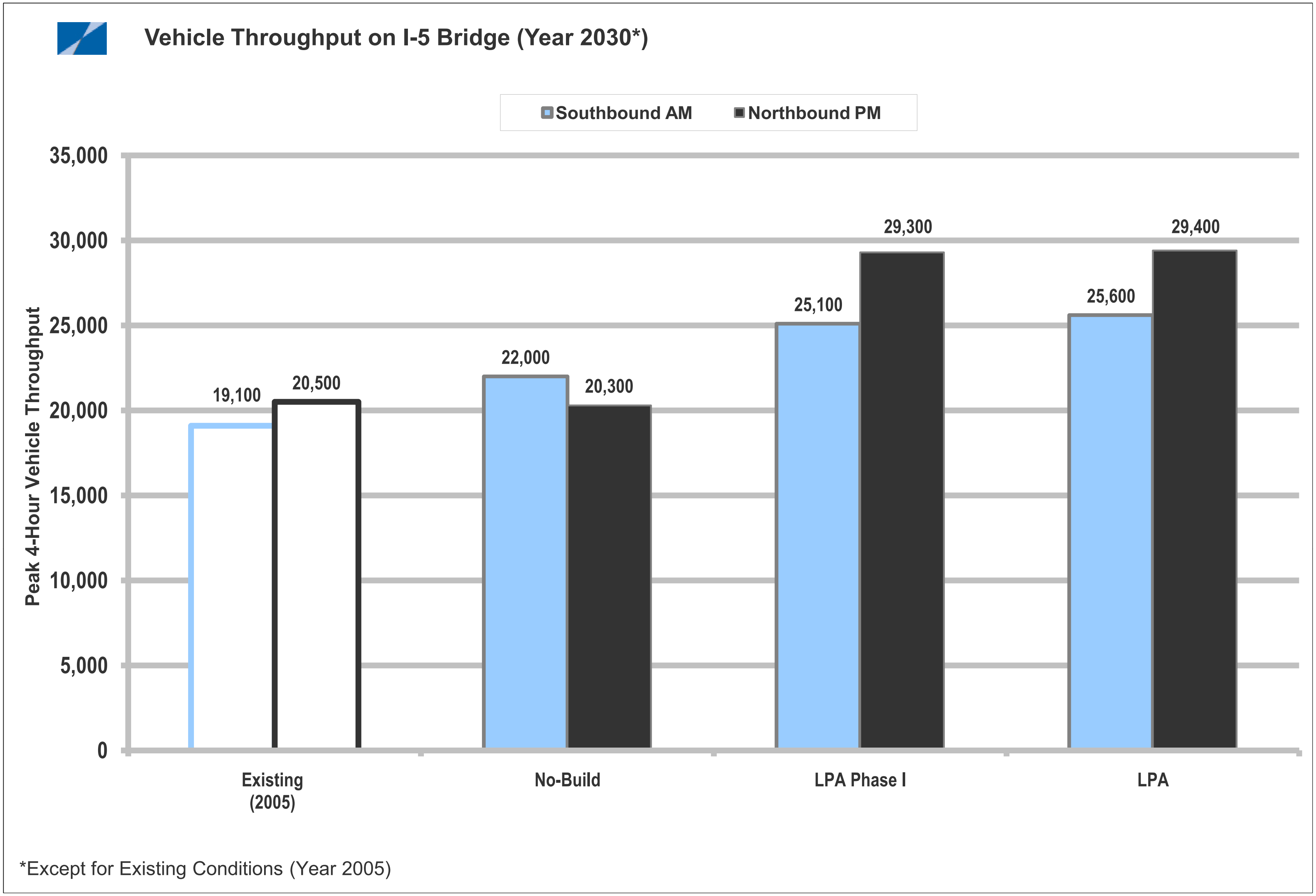
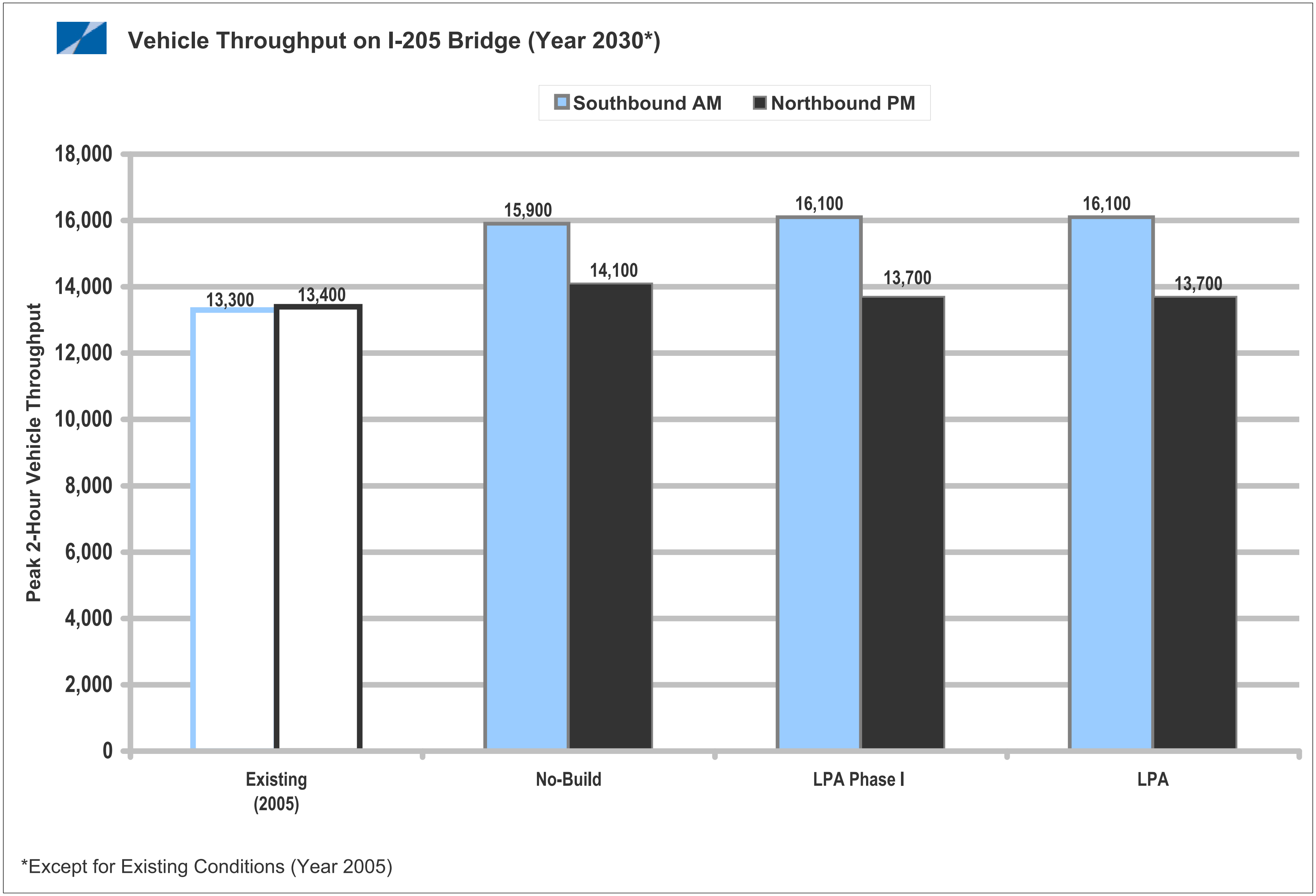

Vehicle Throughput on I-5 Bridge (Year 2030*)
Southbound AM
Northbound PM
Peak 4-Hour Vehicle Throughput
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
19,100
20,500
22,000
20,300
25,100
29,300
25,600
29,400
Existing (2005)
No-Build
LPA Phase I
LPA
*Except for Existing Conditions (Year 2005)

Exhibit 4-17



Vehicle Throughput on I-205 Bridge (Year 2030*)
Southbound AM
Northbound PM
Peak 2-Hour Vehicle Throughput
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
13,300
13,400
15,900
14,100
16,100
13,700
16,100
13,700
Existing (2005)
No-Build
LPA Phase I
LPA
*Except for Existing Conditions (Year 2005)

Exhibit 4-18

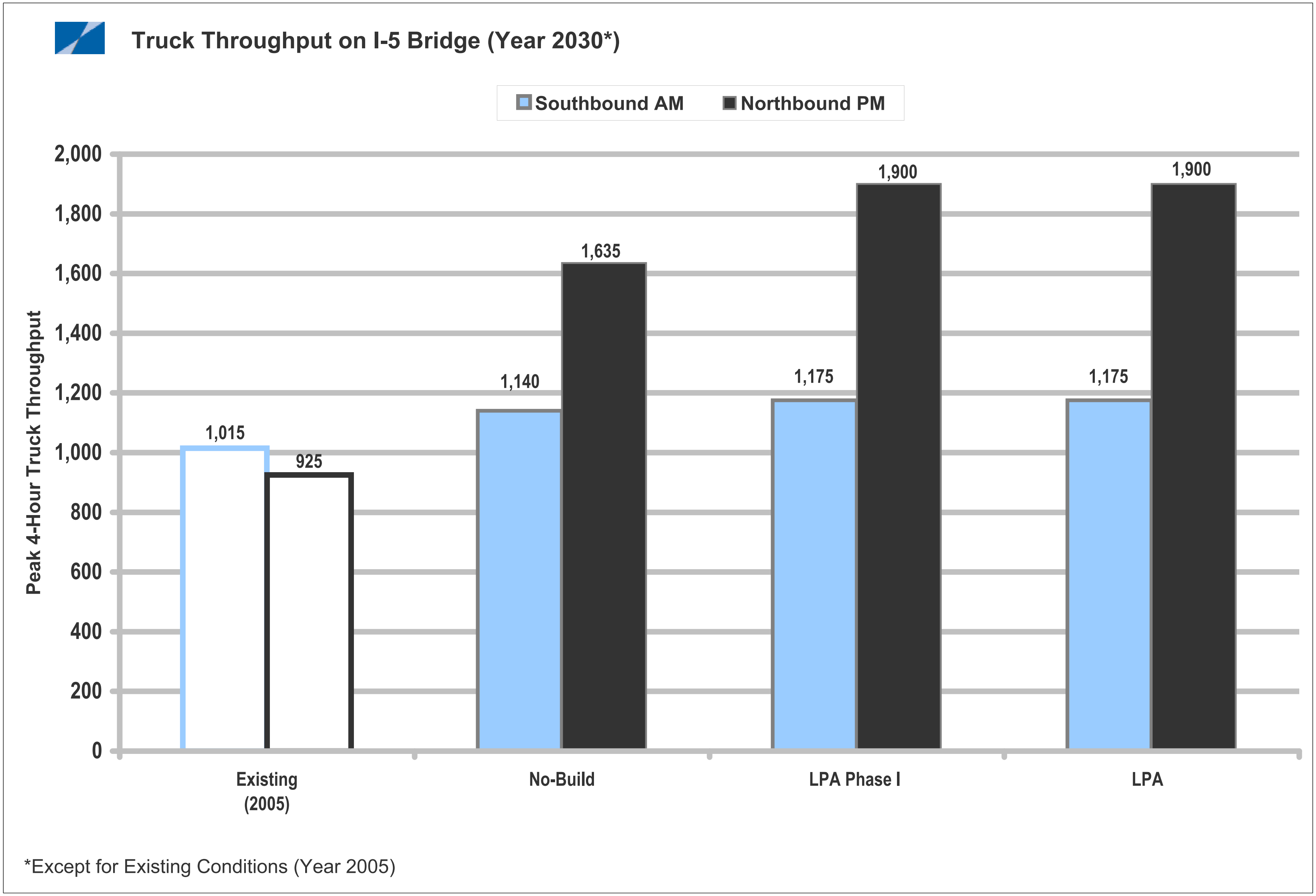
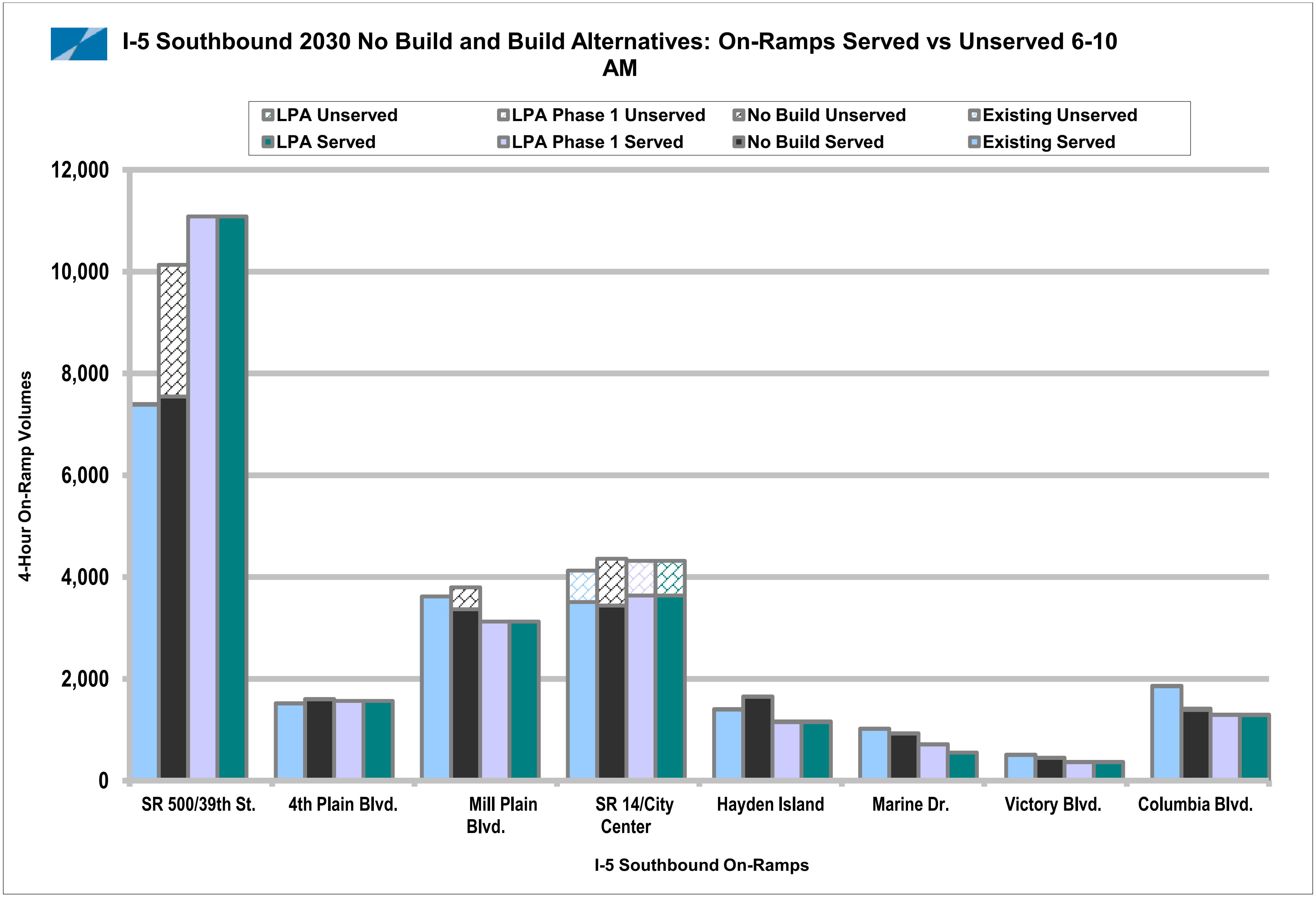
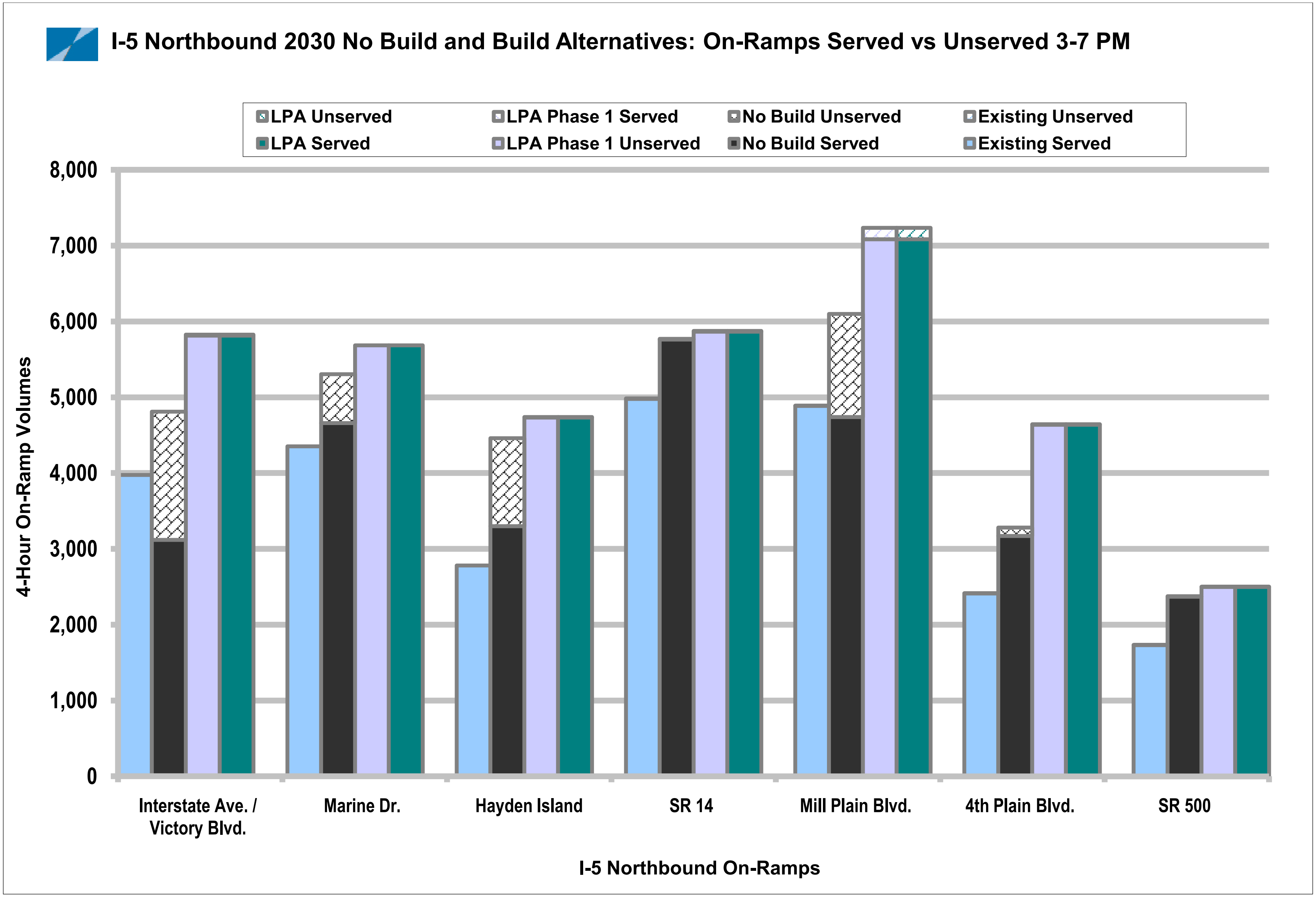

Truck Throughput on I-5 Bridge (Year 2030*)
Southbound AM
Northbound PM
Peak 4-Hour Truck Throughput
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
1,015
925
1,140
1,635
1,175
1,900
1,175
1,900
Existing (2005)
No-Build
LPA Phase I
LPA
*Except for Existing Conditions (Year 2005)

Exhibit 4-19



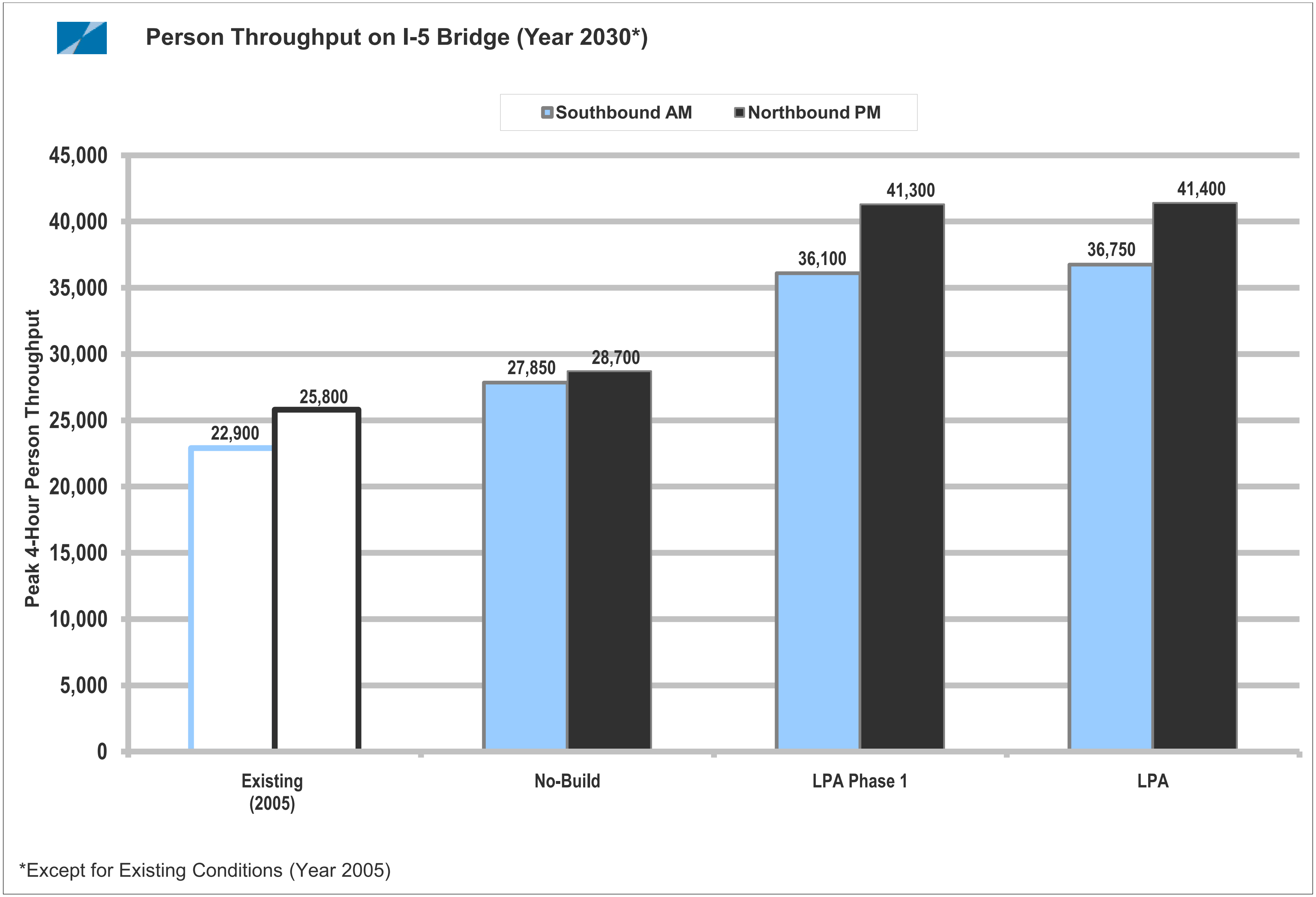
I-5 Southbound 2030 No Build and Build Alternatives: On-Ramps Served vs Unserved 6-10 AM
LPA Unserved
LPA Phase 1 Unserved
No Build Unserved
Existing Unserved
LPA Served
LPA Phase 1 Served
No Build Served
Existing Served
12,000
10,000
8,000
6,000
4,000
2,000
0
4-Hour On-Ramp Volumes
SR 500/39th St.
4th Plain Blvd.
Mill Plain Blvd.
SR 14/City Center
Hayden Island
Marine Dr.
Victory Blvd.
Columbia Blvd.
I-5 Southbound On-Ramps

Exhibit 4-20



I-5 Northbound 2030 No Build and Build Alternatives: On-Ramps Served vs Unserved 3-7 PM
LPA Unserved
LPA Served
LPA Phase 1 Served
LPA Phase 1 Unserved
No Build Unserved
No Build Served
Existing Unserved
Existing Served
4-Hour On-Ramp Volumes
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
Interstate Ave. / Victory Blvd.
Marine Dr.
Hayden Island
SR 14
Mill Plain Blvd.
4th Plain Blvd.
SR 500
I-5 Northbound On-Ramps

Exhibit 4-21



Person Throughput on I-5 Bridge (Year 2030*)
Southbound AM
Northbound PM
Peak 4-Hour Person Throughput
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
22,900
25,800
27,850
28,700
36,100
41,300
36,750
41,400
Existing (2005)
No-Build
LPA Phase 1
LPA
*Except for Existing Conditions (Year 2005)

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Exhibit 4-22

Vancouver Screenline Locations
East-West Screenlines
North-South Screenlines
Vancouver
Fort Vancouver National Historic Site
Pearson Field

Exhibit 4-23

Portland Screenline Locations

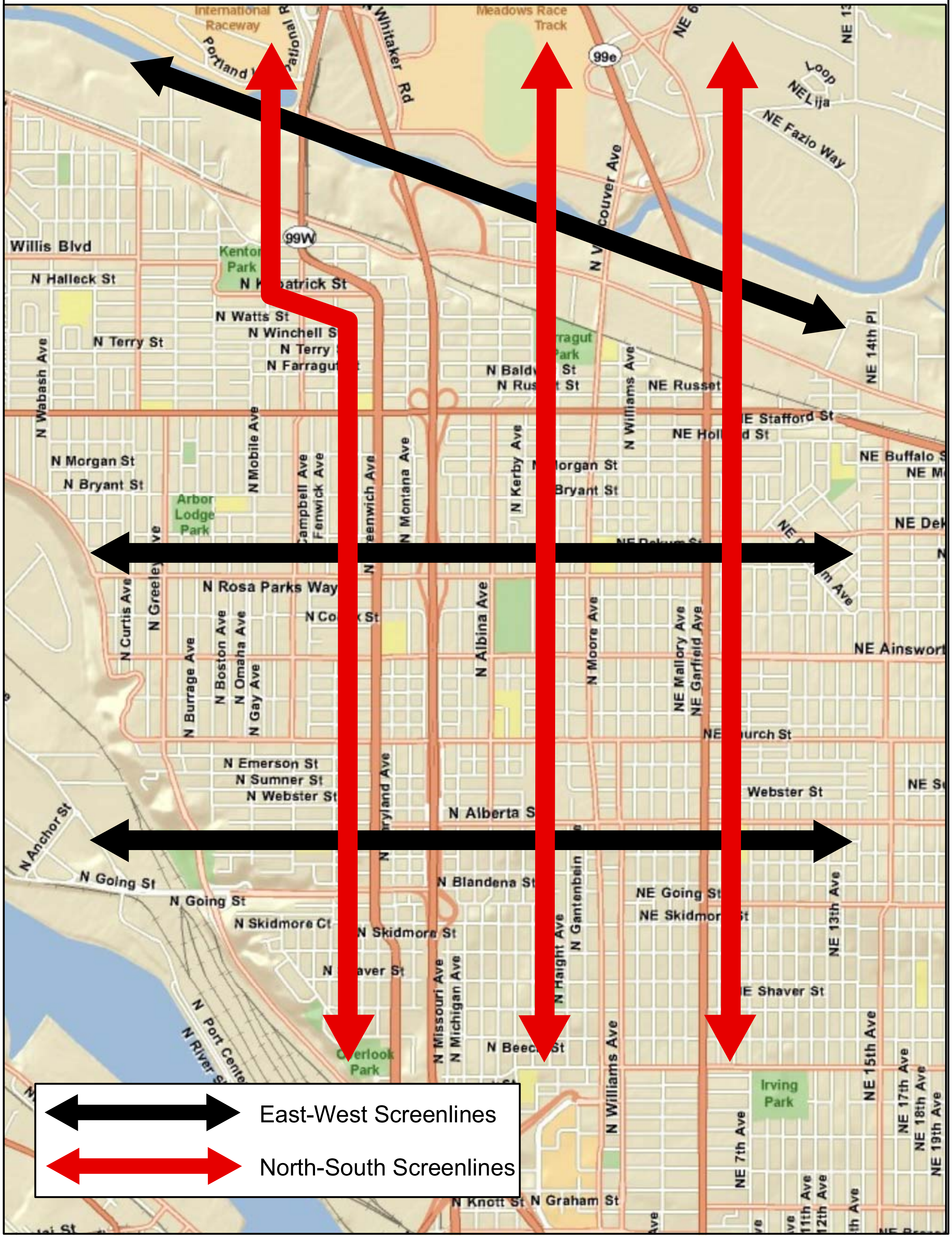


Exhibit 4-24

Vancouver North-South Screenlines - AM Peak Hour Volumes				
Screenline	**2005 Existing**	**2030 No Build**	**2030 LPA Phase 1**	**2030 LPA**
West of Franklin St				
Westbound Total	1,350	2,850	3,150	3,150
Eastbound Total	1,400	2,000	2,300	2,300
West of I-5				
Westbound Total	3,100	4,450	5,050	5,050
Eastbound Total	2,750	3,350	3,900	3,750
East of I-5				
Westbound Total	2,550	3,450	3,500	3,500
Eastbound Total	2,300	3,000	3,850	3,100

Vancouver East-West Screenlines - AM Peak Hour Volumes				
Screenline	**2005 Existing**	**2030 No Build**	**2030 LPA Phase 1**	**2030 LPA**
North of Evergreen Blvd				
Southbound Total	950	1,450	1,600	1,600
Northbound Total	800	1,050	1,100	1,100
North of 15th St				
Southbound Total	1,300	2,100	1,800	1,800
Northbound Total	450	500	600	600
North of 4th Plain Blvd				
Southbound Total	1,500	2,200	1,650	1,650
Northbound Total	350	350	450	450
North of 39th St				
Southbound Total	800	1,250	850	850
Northbound Total	250	250	450	450

Exhibit 4-25

Vancouver North-South Screenlines - PM Peak Hour Volumes				
Screenline	**2005 Existing**	**2030 No Build**	**2030 LPA Phase 1**	**2030 LPA**
West of Franklin St				
Westbound Total	1,550	2,500	2,950	2,950
Eastbound Total	1,750	3,500	3,600	3,600
West of I-5				
Westbound Total	2,900	3,950	4,450	4,450
Eastbound Total	4,200	5,950	6,550	6,300
East of I-5				
Westbound Total	2,550	3,050	3,450	3,450
Eastbound Total	4,050	5,800	5,250	4,350

Vancouver East-West Screenlines - PM Peak Hour Volumes				
Screenline	**2005 Existing**	**2030 No Build**	**2030 LPA Phase 1**	**2030 LPA**
North of Evergreen Blvd				
Southbound Total	950	1,050	1,200	1,200
Northbound Total	1,200	1,850	1,750	1,750
North of 15th St				
Southbound Total	850	1,000	1,050	1,050
Northbound Total	950	1,350	1,250	1,250
North of 4th Plain Blvd				
Southbound Total	600	650	650	650
Northbound Total	950	1,300	950	950
North of 39th St				
Southbound Total	500	550	650	650
Northbound Total	650	950	900	900

Exhibit 4-26

Portland North-South Screenlines - AM Peak Hour Volumes				
Screenline	**2005 Existing**	**2030 No Build**	**2030 LPA Phase One**	**2030 LPA**
West of Interstate				
Westbound Total	3,050	4,250	4,250	4,250
Eastbound Total	2,500	3,200	2,900	2,900
East of I-5				
Westbound Total	2,700	3,450	3,150	3,150
Eastbound Total	2,100	2,950	3,050	3,050
East of MLK Jr Blvd				
Westbound Total	3,350	3,950	3,900	3,900
Eastbound Total	2,250	2,850	3,100	3,100

Portland East-West Screenlines - AM Peak Hour Volumes				
Screenline	**2005 Existing**	**2030 No Build**	**2030 LPA Phase One**	**2030 LPA**
Columbia Slough				
Southbound Total	1,200	1,400	1,400	1,400
Northbound Total	950	1,150	1,050	1,050
North of Rosa Parks				
Southbound Total	1,100	1,150	1,200	1,200
Northbound Total	600	750	750	750
South of Alberta St				
Southbound Total	1,600	1,800	1,800	1,800
Northbound Total	700	1,250	1,000	1,000

Exhibit 4-27

Portland North-South Screenlines - PM Peak Hour Volumes				
Screenline	**2005 Existing**	**2030 No Build**	**2030 LPA Phase One**	**2030 LPA**
West of Interstate				
Westbound Total	2,350	3,100	3,200	3,200
Eastbound Total	3,450	4,950	4,700	4,700
East of I-5				
Westbound Total	2,600	3,300	3,550	3,550
Eastbound Total	2,950	3,850	3,650	3,650
East of MLK Jr Blvd				
Westbound Total	2,650	3,300	3,200	3,200
Eastbound Total	3,350	4,050	3,900	3,900

Portland East-West Screenlines - PM Peak Hour Volumes				
Screenline	**2005 Existing**	**2030 No Build**	**2030 LPA Phase One**	**2030 LPA**
Columbia Slough				
Southbound Total	1,200	1,450	1,350	1,350
Northbound Total	1,350	1,550	1,650	1,650
North of Rosa Parks				
Southbound Total	1,100	1,550	1,400	1,400
Northbound Total	1,600	1,850	1,900	1,900
South of Alberta St				
Southbound Total	1,250	1,750	1,600	1,600
Northbound Total	2,100	2,550	2,400	2,400

Exhibit 4-28

Vancouver Intersection Performance Results

AM Peak Hour — 2005 Existing Conditions

#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)
A	Esther St. @ Columbia Way								
B	Columbia St. @ Columbia Way[3]								
AA	Main St. @ Columbia Way[3]								
01	3rd/4th St. @ Columbia St[3]	Westbound Left/Right	3.7	A	0.03	LOS E	Y	-	-
BB	SR 14 and Main Street[3]								
CC	SR 14 Park and Ride @ Main Street								
C	3rd/4th St. @ Esther St.								
02	4th St. @ Columbia St.	Eastbound Left/Thru/Right	4.4	A	0.03	LOS E	Y	-	-
03	4th St. @ Washington St.	Eastbound Right	1.1	A	0.01	LOS E	Y	-	-
04	5th St. @ Columbia St.	Southbound Left	12.6	B	0.15	LOS E	Y	90	100 (SBL)
DD	5th St. @ Columbia Park and Ride								
05	5th St. @ Washington St.	***Overall Intersection***	39.6	D	0.42	LOS E	Y	180 215	200 (EBR to I-5) 225 (SBL)
EE	5th St. @ Main St.								
06	6th St. @ Columbia St.	***Overall Intersection***	7.8	A	0.42	LOS E	Y	-	-
07	6th St. @ Washington St.	***Overall Intersection***	20.3	C	0.39	LOS E	Y	-	-
08	6th St. @ Main St.	***Overall Intersection***	6.5	A	0.38	LOS E	Y	-	-
09	6th St. @ Broadway	Southbound Right	1.8	A	0.02	LOS E	Y	-	-
10	6th St. @ C St.	Northbound Left/Thru	5.7	A	-	LOS E	Y	-	-
11	8th St. @ Esther St.	Southbound Left/Thru/Right	6.0	A	0.08	LOS E	Y	-	-
12	8th St. @ Columbia St.	***Overall Intersection***	10.8	B	0.51	LOS E	Y	-	-
13	8th St. @ Washington St.	***Overall Intersection***	5.4	A	0.55	LOS E	Y	-	-
14	8th St. @ Main St.	***Overall Intersection***	11.3	B	0.55	LOS E	Y	-	-
15	8th St. @ Broadway	Southbound Left	6.6	A	0.22	LOS E	Y	-	-
16	8th St. @ C St.	***Overall Intersection***	10.0	A	0.48	LOS E	Y	-	-
17	9th St. @ Esther St.	Westbound Left/Thru/Right	5.6	A	0.08	LOS E	Y	-	-
18	9th St. @ Columbia St.	Eastbound Left/Thru/Right	5.4	A	0.05	LOS E	Y	-	-
19	9th St. @ Washington St.	Westbound Left	6.4	A	0.01	LOS E	Y	-	-
20	9th St. @ Main St.	Northbound Left	6.2	A	0.05	LOS E	Y	50	75 (NBL)
21	9th St. @ Broadway	Southbound Thru/Right	5.6	A	0.27	LOS E	Y	-	-
22	Evergreen Blvd. @ Esther St.	Northbound Left/Thru/Right	4.7	A	0.12	LOS E	Y	-	-
23	Evergreen Blvd. @ Columbia St.	***Overall Intersection***	13.4	B	0.49	LOS E	Y	-	-
24	Evergreen Blvd. @ Washington St.	***Overall Intersection***	9.1	A	0.53	LOS E	Y	-	-
25	Evergreen Blvd. @ Main St.	***Overall Intersection***	7.9	A	0.53	LOS E	Y	-	-
26	Evergreen Blvd. @ Broadway	***Overall Intersection***	18.7	B	0.83	LOS E	Y	75 100 210	75 (WBL) 100 (SBL) 225 (SBTR)
27	Evergreen Blvd. @ C St.	***Overall Intersection***	11.9	B	0.83	LOS E	Y	-	-
28	11th St. @ Esther St.	Southbound Left/Thru/Right	4.3	A	0.03	LOS E	Y	-	-
29	11th St. @ Columbia St.	Westbound Left/Thru/Right	6.9	A	0.14	LOS E	Y	-	-
30	11th St. @ Washington St.	Eastbound Thru/Right	6.0	A	0.07	LOS E	Y	-	-
31	11th St. @ Main St.	Eastbound Thru/Right	4.7	A	0.08	LOS E	Y	-	-
32	11th St. @ Broadway	Eastbound Thru/Right	6.1	A	0.06	LOS E	Y	-	-
33	11th St. @ C St.	Eastbound Left/Thru	4.2	A	0.08	LOS E	Y	-	-
34	Mill Plain Blvd. @ Columbia St.	***Overall Intersection***	12.8	B	0.66	LOS E	Y	-	-
35	Mill Plain Blvd. @ Washington St.	***Overall Intersection***	7.2	A	0.40	LOS E	Y	-	-
36	Mill Plain Blvd. @ Main St.	***Overall Intersection***	4.7	A	0.57	LOS E	Y	-	-
37	Mill Plain Blvd. @ Broadway	***Overall Intersection***	12.2	B	0.51	LOS E	Y	190	200 (SBLT)
38	Mill Plain Blvd. @ C St.	***Overall Intersection***	8.3	A	0.34	LOS E	Y	-	-
39	Mill Plain Blvd. @ I-5 SB On-/Off-Ramps	***Overall Intersection***	18.6	B	0.58	LOS E	Y	350 275	375 (EBR) 350 (WBL)
FF	Mill Plain Blvd. @ I-5 SPUI								
40	Mill Plain Blvd. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	21.8	C	0.54	LOS E	Y	75	100 (WBR)
41	15th St. @ Columbia St.	***Overall Intersection***	10.1	B	0.53	LOS E	Y	-	-
42	15th St. @ Washington St.	***Overall Intersection***	4.9	A	0.44	LOS E	Y	-	-
GG	15th St. @ Mill District Park & Ride								
43	15th St. @ Main St.	***Overall Intersection***	7.5	A	0.48	LOS E	Y	-	-
44	15th St. @ Broadway	***Overall Intersection***	18.2	B	0.47	LOS E	Y	-	-
45	15th St. @ C St.	***Overall Intersection***	8.8	A	0.48	LOS E	Y	-	-
D	16th St. @ Washington St.								
HH	16th St. @ Mill District Park & Ride								
E	16th St. @ Main St.								
F	17th Street & Washington								
G	17th Street & Main								
H	17th Street & Broadway								
I	17th Street & C Street								
J	17th Street & G Street								
46	McLoughlin Blvd. @ Columbia St.	***Overall Intersection***	7.3	A	0.52	LOS E	Y	-	-
K	McLoughlin Blvd. @ Washington St.								
47	McLoughlin Blvd. @ Main St.	***Overall Intersection***	11.0	B	0.55	LOS E	Y	-	-
48	McLoughlin Blvd. @ Broadway	***Overall Intersection***	10.1	B	0.46	LOS E	Y	-	-
L	McLoughlin Blvd. @ C St.								
M	McLoughlin Blvd. @ G St.								
II	McLoughlin Blvd. @ Clark College Park & Ride								
JJ	McLoughlin Blvd. @ Marshall CC East								
49	McLoughlin Blvd. @ Fort Vancouver Way	***Overall Intersection***	9.1	A	0.36	LOS D	Y	-	-
50	24th St. @ Columbia St.	Westbound Left/Thru/Right	8.4	A	0.12	LOS E	Y	-	-
51	24th St. @ Main St.	Eastbound Left/Right	6.6	A	0.06	LOS E	Y	-	-
52	4th Plain Blvd. @ Columbia St.	***Overall Intersection***	18.8	B	0.61	LOS D	Y	-	-
53	4th Plain Blvd. @ Main St.	***Overall Intersection***	35.7	D	0.66	LOS D	Y	125 200 75 470	150 (WBL) 200 (WBTR) 100 (SBL) 475 (SBTR)
54	4th Plain Blvd. @ Broadway	***Overall Intersection***	18.4	B	0.65	LOS D	Y	-	-
55	4th Plain Blvd. @ F St.	***Overall Intersection***	12.5	B	0.50	LOS D	Y	150	200 (EBL)
56	4th Plain Blvd. @ I-5 SB On-/Off-Ramps	***Overall Intersection***	8.8	A	0.46	LOS D	Y	-	-
57	4th Plain Blvd. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	12.3	B	0.51	LOS D	Y	75	150 (WBR)
58	4th Plain Blvd. @ Post Cemetery	Eastbound Left	6.5	A	0.01	LOS E	Y	-	-
59	4th Plain Blvd. @ St. Johns Blvd.	***Overall Intersection***	13.2	B	0.41	LOS D	Y	-	-
60	28th St. @ Main St.	Eastbound Left/Thru/Right	> 100	F	0.07	LOS E	N	215	225 (SBTR)
61	28th St. @ Broadway	Northbound Thru/Right	1.0	A	-	LOS E	Y	-	-
62	29th St. @ Main St./Broadway	Eastbound Left/Thru/Right	23.8	C	-	LOS E	Y	-	-
63	33rd St. @ Main St.	***Overall Intersection***	18.3	B	0.54	LOS D	Y	50 75	75 (WBL) 100 (SBL)

AM Peak Hour — 2030 No-Build

#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)
A	Esther St. @ Columbia Way	Eastbound Left	5.6	A	0.01	LOS E	Y	-	-
B	Columbia St. @ Columbia Way[3]	Eastbound Left	4.5	A	0.05	LOS E	Y	-	-
AA	Main St. @ Columbia Way[3]				-				
01	3rd/4th St. @ Columbia St[3]	Eastbound Left/Right	4.8	A	0.04	LOS E	Y	-	-
BB	SR 14 and Main Street[3]								
CC	SR 14 Park and Ride @ Main Street								
C	3rd/4th St. @ Esther St.	Westbound Left/Right	3.6	A	0.09	LOS E	Y	-	-
02	4th St. @ Columbia St.	Northbound Thru/Right	0.2	A	0.08	LOS E	Y	-	-
03	4th St. @ Washington St.	Eastbound Right	2.7	A	0.03	LOS E	Y	-	-
04	5th St. @ Columbia St.	Southbound Left	3.0	A	0.12	LOS E	Y	-	-
DD	5th St. @ Columbia Park and Ride								
05	5th St. @ Washington St.	***Overall Intersection***	9.5	A	0.44	LOS E	Y	-	-
EE	5th St. @ Main St.								
06	6th St. @ Columbia St.	***Overall Intersection***	7.9	A	0.45	LOS E	Y	-	-
07	6th St. @ Washington St.	***Overall Intersection***	11.8	B	0.48	LOS E	Y	-	-
08	6th St. @ Main St.	***Overall Intersection***	7.6	A	0.53	LOS E	Y	-	-
09	6th St. @ Broadway	Southbound Right	4.7	A	0.36	LOS E	Y	-	-
10	6th St. @ C St.	Northbound Left/Thru	16.7	C	-	LOS E	Y	850	850 (NBLT)
11	8th St. @ Esther St.	Southbound Left/Thru/Right	8.8	A	0.19	LOS E	Y	-	-
12	8th St. @ Columbia St.	***Overall Intersection***	12.2	B	0.85	LOS E	Y	-	-
13	8th St. @ Washington St.	***Overall Intersection***	11.5	B	0.59	LOS E	Y	-	-
14	8th St. @ Main St.	***Overall Intersection***	12.2	B	0.58	LOS E	Y	-	-
15	8th St. @ Broadway	Southbound Left/Thru/Right	10.3	B	0.65	LOS E	Y	-	-
16	8th St. @ C St.	***Overall Intersection***	16.2	B	0.58	LOS E	Y	-	-
17	9th St. @ Esther St.	Westbound Left/Thru/Right	4.2	A	6.00	LOS E	Y	-	-
18	9th St. @ Columbia St.	Westbound Left/Thru/Right	7.0	A	0.13	LOS E	Y	-	-
19	9th St. @ Washington St.	Westbound Left	5.4	A	0.04	LOS E	Y	-	-
20	9th St. @ Main St.	Eastbound Left/Thru/Right	4.6	A	0.06	LOS E	Y	-	-
21	9th St. @ Broadway	Eastbound Left/Right	3.9	A	0.04	LOS E	Y	-	-
22	Evergreen Blvd. @ Esther St.	Northbound Left/Thru/Right	7.6	A	0.12	LOS E	Y	-	-
23	Evergreen Blvd. @ Columbia St.	***Overall Intersection***	13.0	B	0.63	LOS E	Y	-	-
24	Evergreen Blvd. @ Washington St.	***Overall Intersection***	17.2	B	0.60	LOS E	Y	75	100 (WBL)
25	Evergreen Blvd. @ Main St.	***Overall Intersection***	14.8	B	0.68	LOS E	Y	-	-
26	Evergreen Blvd. @ Broadway	***Overall Intersection***	14.9	B	0.70	LOS E	Y	75 210	125 (WBL) 225 (WBTR)
27	Evergreen Blvd. @ C St.	***Overall Intersection***	14.3	B	0.64	LOS E	Y	-	-
28	11th St. @ Esther St.	Southbound Left/Thru/Right	4.6	A	0.05	LOS E	Y	-	-
29	11th St. @ Columbia St.	Westbound Left/Thru/Right	8.1	A	0.29	LOS E	Y	-	-
30	11th St. @ Washington St.	Westbound Left/Thru	7.9	A	0.23	LOS E	Y	-	-
31	11th St. @ Main St.	Westbound Left/Thru/Right	6.3	A	0.16	LOS E	Y	-	-
32	11th St. @ Broadway	Westbound Left/Thru/Right	6.9	A	0.22	LOS E	Y	-	-
33	11th St. @ C St.	Eastbound Left/Thru	6.3	A	0.17	LOS E	Y	-	-
34	Mill Plain Blvd. @ Columbia St.	***Overall Intersection***	18.4	B	0.77	LOS E	Y	75 210	150 (SBL) 225 (SBT)
35	Mill Plain Blvd. @ Washington St.	***Overall Intersection***	7.0	A	0.43	LOS E	Y	-	-
36	Mill Plain Blvd. @ Main St.	***Overall Intersection***	11.5	B	1.01	LOS E	Y	70	150 (SBL)
37	Mill Plain Blvd. @ Broadway	***Overall Intersection***	10.3	B	0.68	LOS E	Y	70	150 (SBL)
38	Mill Plain Blvd. @ C St.	***Overall Intersection***	8.0	A	0.38	LOS E	Y	-	-
39	Mill Plain Blvd. @ I-5 SB On-/Off-Ramps	***Overall Intersection***	20.4	C	0.75	LOS E	Y	800 350 275	800 (EBT) 500 (EBR) 350 (WBL)
FF	Mill Plain Blvd. @ I-5 SPUI								
40	Mill Plain Blvd. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	36.0	D	0.88	LOS E	Y	590 325	600 (NBLT) 500 (NBR)
41	15th St. @ Columbia St.	***Overall Intersection***	17.4	B	0.77	LOS E	Y	220	225 (WBLT)
42	15th St. @ Washington St.	***Overall Intersection***	12.3	B	0.54	LOS E	Y	210 210	250 (WBL) 225 (WBT)
GG	15th St. @ Mill District Park & Ride								
43	15th St. @ Main St.	***Overall Intersection***	14.7	B	1.01	LOS E	Y	195	200 (WBLT)
44	15th St. @ Broadway	***Overall Intersection***	14.2	B	0.68	LOS E	Y	205	225 (WBLT)
45	15th St. @ C St.	***Overall Intersection***	8.3	A	0.58	LOS E	Y	-	-
D	16th St. @ Washington St.	Westbound Left/Thru	6.1	A	0.18	LOS E	Y	-	-
HH	16th St. @ Mill District Park & Ride								
E	16th St. @ Main St.	Eastbound Left/Thru/Right	9.6	A	0.17	LOS E	Y	-	-
F	17th Street & Washington	Westbound Left/Thru	6.6	A	0.14	LOS E	Y	-	-
G	17th Street & Main	Eastbound Thru/Right	10.5	B	0.14	LOS E	Y	-	-
H	17th Street & Broadway	Westbound Left/Thru/Right	9.5	A	0.11	LOS E	Y	-	-
I	17th Street & C Street	Eastbound Left/Thru	5.7	A	0.09	LOS E	Y	-	-
J	17th Street & G Street	Eastbound Left/Thru/Right	2.7	A	0.04	LOS E	Y	-	-
46	McLoughlin Blvd. @ Columbia St.	***Overall Intersection***	12.2	B	0.64	LOS E	Y	-	-
K	McLoughlin Blvd. @ Washington St.	***Overall Intersection***	5.5	A	0.39	LOS E	Y	-	-
47	McLoughlin Blvd. @ Main St.	***Overall Intersection***	16.1	B	0.70	LOS E	Y	-	-
48	McLoughlin Blvd. @ Broadway	***Overall Intersection***	18.0	B	0.59	LOS E	Y	75	100 (WBL)
L	McLoughlin Blvd. @ C St.	***Overall Intersection***	5.9	A	0.30	LOS E	Y	-	-
M	McLoughlin Blvd. @ G St.	Northbound Left/Thru/Right	6.2	A	-	LOS E	Y	-	-
II	McLoughlin Blvd. @ Clark College Park & Ride								
JJ	McLoughlin Blvd. @ Marshall CC East								
49	McLoughlin Blvd. @ Fort Vancouver Way	***Overall Intersection***	11.7	B	0.42	LOS D	Y	-	-
50	24th St. @ Columbia St.	Eastbound Left/Thru/Right	9.0	A	0.04	LOS E	Y	-	-
51	24th St. @ Main St.	Eastbound Left/Right	9.8	A	0.05	LOS E	Y	-	-
52	4th Plain Blvd. @ Columbia St.	***Overall Intersection***	20.4	C	0.74	LOS D	Y	235	250 (SBTR)
53	4th Plain Blvd. @ Main St.	***Overall Intersection***	36.1	D	0.76	LOS D	Y	170 195 75 470	200 (WBL) 200 (WBT) 125 (SBL) 475 (SBTR)
54	4th Plain Blvd. @ Broadway	***Overall Intersection***	> 100	F	0.67	LOS D	N	195 495	200 (EBLT) 500 (WBT)
55	4th Plain Blvd. @ F St.	***Overall Intersection***	11.2	B	0.53	LOS D	Y	150	150 (EBT)
56	4th Plain Blvd. @ I-5 SB On-/Off-Ramps	***Overall Intersection***	17.5	B	0.64	LOS D	Y	200	275 (EBL)
57	4th Plain Blvd. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	16.2	B	0.58	LOS D	Y	75	125 (WBR)
58	4th Plain Blvd. @ Post Cemetery	Eastbound Left	7.4	A	0.00	LOS E	Y	-	-
59	4th Plain Blvd. @ St. Johns Blvd.	***Overall Intersection***	16.8	B	0.42	LOS D	Y	-	-
60	28th St. @ Main St.	Eastbound Left/Thru/Right	> 100	F	0.10	LOS E	N	215	225 (SBTR)
61	28th St. @ Broadway	Westbound Left	5.4	A	0.24	LOS E	Y	-	-
62	29th St. @ Main St./Broadway	Westbound Left/Thru/Right	74.8	F	-	LOS E	N	1000	1000 (SBTR)
63	33rd St. @ Main St.	***Overall Intersection***	34.8	C	0.70	LOS D	Y	50 50 75	50 (EBL) 75 (WBL) 100 (NBL)

AM Peak Hour — 2030 LPA with Highway Phasing (Broadway-Washington/17th)

#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)
A	Esther St. @ Columbia Way	Southbound Left/Right	5.4	A	0.32	LOS E	Y	-	-
B	Columbia St. @ Columbia Way[3]	Southbound Left/Right	2.3	A	0.29	LOS E	Y	-	-
AA	Main St. @ Columbia Way[3]	Westbound Thru/Right	1.3	A	0.25	LOS E	Y	-	-
01	3rd/4th St. @ Columbia St[3]	Southbound Left/Thru/Right	7.8	A	0.73	LOS E	Y	-	-
BB	SR 14 and Main Street[3]	Southbound Left/Thru	2.4	A	0.34	LOS E	Y	-	-
CC	SR 14 Park and Ride @ Main Street	Southbound Thru/Right	1.3	A	0.24	LOS E	Y	-	-
C	3rd/4th St. @ Esther St.	Westbound Left/Right	5.1	A	0.31	LOS E	Y	-	-
02	4th St. @ Columbia St.								
03	4th St. @ Washington St.								
04	5th St. @ Columbia St.	Southbound Left	8.7	A	0.15	LOS E	Y	-	-
DD	5th St. @ Columbia Park and Ride	Northbound Left/Right	2.6	A	0.07	LOS E	Y	-	-
05	5th St. @ Washington St.	***Overall Intersection***	9.2	A	0.43	LOS E	Y	-	-
EE	5th St. @ Main St.	***Overall Intersection***	18.2	B	0.80	LOS E	Y	160 75 185	175 (EBLTR) 100 (SBL) 200 (SBTR)
06	6th St. @ Columbia St.	***Overall Intersection***	15.0	B	0.98	LOS E	Y	200 75 205	200 (WBLTR) 100 (NBL) 225 (NBTR)
07	6th St. @ Washington St.	***Overall Intersection***	14.6	B	0.29	LOS E	Y	-	-
08	6th St. @ Main St.	***Overall Intersection***	8.6	A	0.79	LOS E	Y	75 185	100 (NBL) 200 (NBTR)
09	6th St. @ Broadway	Eastbound Left/Thru	1.7	A	0.25	LOS E	Y	-	-
10	6th St. @ C St.	Southbound Thru	3.7	A	0.36	LOS E	Y	-	-
11	8th St. @ Esther St.	Northbound Left/Thru/Right	7.3	A	0.27	LOS E	Y	-	-
12	8th St. @ Columbia St.	***Overall Intersection***	15.4	B	0.68	LOS E	Y	75 75 210	125 (SBL) 100 (WBL) 225 (WBTR)
13	8th St. @ Washington St.	***Overall Intersection***	11.9	B	0.54	LOS E	Y	-	-
14	8th St. @ Main St.	***Overall Intersection***	15.2	B	0.63	LOS E	Y	-	-
15	8th St. @ Broadway	***Overall Intersection***	7.0	A	0.63	LOS E	Y	-	-
16	8th St. @ C St.	***Overall Intersection***	11.2	B	0.52	LOS E	Y	-	-
17	9th St. @ Esther St.	Westbound Left/Thru/Right	5.9	A	0.07	LOS E	Y	-	-
18	9th St. @ Columbia St.	Westbound Left/Thru/Right	6.2	A	0.08	LOS E	Y	-	-
19	9th St. @ Washington St.	***Overall Intersection***	8.0	A	0.44	LOS E	Y	-	-
20	9th St. @ Main St.	Eastbound Left/Thru/Right	7.9	A	0.17	LOS E	Y	-	-
21	9th St. @ Broadway	***Overall Intersection***	3.6	A	0.35	LOS E	Y	-	-
22	Evergreen Blvd. @ Esther St.	Northbound Left/Thru/Right	10.5	B	0.23	LOS E	Y	-	-
23	Evergreen Blvd. @ Columbia St.	***Overall Intersection***	19.4	B	0.75	LOS E	Y	225 100 205	225 (WBTR) 125 (NBL) 225 (SBTR)
24	Evergreen Blvd. @ Washington St.	***Overall Intersection***	11.8	B	0.56	LOS E	Y	210	225 (SBTR)
25	Evergreen Blvd. @ Main St.	***Overall Intersection***	10.4	B	0.65	LOS E	Y	-	-
26	Evergreen Blvd. @ Broadway	***Overall Intersection***	10.3	B	0.52	LOS E	Y	-	-
27	Evergreen Blvd. @ C St.	***Overall Intersection***	11.5	B	0.68	LOS E	Y	-	-
28	11th St. @ Esther St.	Northbound Left/Thru/Right	4.8	A	0.14	LOS E	Y	-	-
29	11th St. @ Columbia St.	Eastbound Left/Thru/Right	15.6	C	0.25	LOS E	Y	-	-
30	11th St. @ Washington St.	***Overall Intersection***	10.1	B	0.46	LOS E	Y	-	-
31	11th St. @ Main St.	Westbound Left/Thru/Right	10.5	B	0.19	LOS E	Y	-	-
32	11th St. @ Broadway	***Overall Intersection***	10.1	B	0.40	LOS E	Y	-	-
33	11th St. @ C St.	Eastbound Left/Thru/Right	6.7	A	0.14	LOS E	Y	-	-
34	Mill Plain Blvd. @ Columbia St.	***Overall Intersection***	15.4	B	1.06	LOS E	Y	75 210	150 (SBL) 225 (SBT)
35	Mill Plain Blvd. @ Washington St.	***Overall Intersection***	17.7	B	0.50	LOS E	Y	205	225 (SBLT)
36	Mill Plain Blvd. @ Main St.	***Overall Intersection***	14.3	B	1.09	LOS E	Y	70 210	150 (SBL) 225 (SBT)
37	Mill Plain Blvd. @ Broadway	***Overall Intersection***	9.4	A	0.38	LOS E	Y	-	-
38	Mill Plain Blvd. @ C St.	***Overall Intersection***	12.8	B	1.02	LOS E	Y	200 75 200	200 (EBLTR) 125 (SBL) 200 (SBT)
39	Mill Plain Blvd. @ I-5 SB On-/Off-Ramps								
FF	Mill Plain Blvd. @ I-5 SPUI	***Overall Intersection***	22.1	C	0.63	LOS E	Y	-	-
40	Mill Plain Blvd. @ I-5 NB On-/Off-Ramps								
41	15th St. @ Columbia St.	***Overall Intersection***	22.5	C	1.06	LOS E	Y	225 75	225 (WBLTR) 75 (NBL)
42	15th St. @ Washington St.	***Overall Intersection***	7.4	A	0.56	LOS E	Y	70	75 (WBT)
GG	15th St. @ Mill District Park & Ride	Westbound Thru/Right	2.1	A	0.41	LOS E	Y	90	100 (WBTR)
43	15th St. @ Main St.	***Overall Intersection***	24.2	C	1.09	LOS E	Y	190 225	200 (WBT) 225 (SBTR)
44	15th St. @ Broadway	***Overall Intersection***	11.0	B	0.59	LOS E	Y	200	200 (WBTR)
45	15th St. @ C St.	***Overall Intersection***	47.1	D	1.02	LOS E	Y	-	-
D	16th St. @ Washington St.	***Overall Intersection***	21.6	C	0.30	LOS E	Y	65	75 (WBLTR)
HH	16th St. @ Mill District Park & Ride	Northbound Right	2.5	A	0.03	LOS E	Y	-	-
E	16th St. @ Main St.	***Overall Intersection***	12.8	B	0.49	LOS E	Y	180	200 (SBLTR)
F	17th Street & Washington	***Overall Intersection***	8.6	A	0.27	LOS E	Y	-	-
G	17th Street & Main	***Overall Intersection***	4.1	A	0.50	LOS E	Y	-	-
H	17th Street & Broadway	***Overall Intersection***	9.2	A	0.15	LOS E	Y	-	-
I	17th Street & C Street	***Overall Intersection***	8.0	A	0.23	LOS E	Y	-	-
J	17th Street & G Street	***Overall Intersection***	6.0	A	0.13	LOS E	Y	-	-
46	McLoughlin Blvd. @ Columbia St.	***Overall Intersection***	11.8	B	0.65	LOS E	Y	-	-
K	McLoughlin Blvd. @ Washington St.	***Overall Intersection***	9.1	A	0.52	LOS E	Y	-	-
47	McLoughlin Blvd. @ Main St.	***Overall Intersection***	21.2	C	0.83	LOS E	Y	220 50	225 (WBLTR) 100 (SBR)
48	McLoughlin Blvd. @ Broadway	***Overall Intersection***	23.7	C	0.54	LOS E	Y	200	200 (WBT)
L	McLoughlin Blvd. @ C St.	***Overall Intersection***	11.3	B	0.49	LOS E	Y	-	-
M	McLoughlin Blvd. @ G St.	Southbound Left/Thru/Right	5.5	A	-	LOS E	Y	-	-
II	McLoughlin Blvd. @ Clark College Park & Ride	***Overall Intersection***	10.3	B	0.33	LOS D	Y	-	-
JJ	McLoughlin Blvd. @ Marshall CC East	***Overall Intersection***	1.9	A	0.30	LOS D	Y	-	-
49	McLoughlin Blvd. @ Fort Vancouver Way	***Overall Intersection***	15.4	B	0.55	LOS D	Y	-	-
50	24th St. @ Columbia St.	Eastbound Left/Thru/Right	7.9	A	0.03	LOS E	Y	-	-
51	24th St. @ Main St.	Eastbound Left/Right	7.8	A	0.04	LOS E	Y	-	-
52	4th Plain Blvd. @ Columbia St.	***Overall Intersection***	16.5	B	0.64	LOS D	Y	235	250 (SBTR)
53	4th Plain Blvd. @ Main St.	***Overall Intersection***	49.5	D	0.72	LOS D	Y	170 195 75 75 470	225 (WBL) 200 (WBTR) 75 (NBR) 125 (SBL) 475 (SBTR)
54	4th Plain Blvd. @ Broadway	***Overall Intersection***	42.9	D	0.60	LOS D	Y	495 195	500 (WBTR) 200 (SBLTR)
55	4th Plain Blvd. @ F St.	***Overall Intersection***	10.0	A	0.55	LOS D	Y	150	150 (EBT)
56	4th Plain Blvd. @ I-5 SB On-/Off-Ramps	***Overall Intersection***	21.9	C	0.58	LOS D	Y	200	250 (EBL)
57	4th Plain Blvd. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	19.9	B	0.51	LOS D	Y	-	-
58	4th Plain Blvd. @ Post Cemetery	Eastbound Left	6.7	A	0.01	LOS E	Y	-	-
59	4th Plain Blvd. @ St. Johns Blvd.	***Overall Intersection***	17.5	B	0.43	LOS D	Y	-	-
60	28th St. @ Main St.	Eastbound Left/Thru/Right	> 100	F	0.23	LOS E	Y**	325 215	325 (EBLTR) 225 (SBTR)
61	28th St. @ Broadway	Westbound Left	4.2	A	0.11	LOS E	Y	-	-
62	29th St. @ Main St./Broadway	Westbound Left/Thru/Right	> 100	F	-	LOS E	N	1050	1050 (SBTR)
63	33rd St. @ Main St.	***Overall Intersection***	15.2	B	0.57	LOS D	Y	50	75 (WBL)

AM Peak Hour — 2030 LPA (Broadway-Washington/17th)

#	Intersection	Approach/Movement	Delay (Seconds)	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)
A	Esther St. @ Columbia Way	Southbound Left/Right	5.4	5.4	A	0.32	LOS E	Y	-	-
B	Columbia St. @ Columbia Way[3]	Southbound Left/Right	2.3	2.3	A	0.29	LOS E	Y	-	-
AA	Main St. @ Columbia Way[3]	Westbound Thru/Right	1.3	1.3	A	0.25	LOS E	Y	-	-
01	3rd/4th St. @ Columbia St[3]	Southbound Left/Thru/Right	7.8	7.8	A	0.73	LOS E	Y	-	-
BB	SR 14 and Main Street[3]	Southbound Left/Thru	2.4	2.4	A	0.34	LOS E	Y	-	-
CC	SR 14 Park and Ride @ Main Street	Southbound Thru/Right	1.3	1.3	A	0.24	LOS E	Y	-	-
C	3rd/4th St. @ Esther St.	Westbound Left/Right	5.1	5.1	A	0.31	LOS E	Y	-	-
02	4th St. @ Columbia St.									
03	4th St. @ Washington St.									
04	5th St. @ Columbia St.	Southbound Left	8.7	8.7	A	0.15	LOS E	Y	-	-
DD	5th St. @ Columbia Park and Ride	Northbound Left/Right	2.6	2.6	A	0.07	LOS E	Y	-	-
05	5th St. @ Washington St.	***Overall Intersection***	9.2	9.2	A	0.43	LOS E	Y	-	-
EE	5th St. @ Main St.	***Overall Intersection***	18.2	18.2	B	0.80	LOS E	Y	160 75 185	175 (EBLTR) 100 (SBL) 200 (SBTR)
06	6th St. @ Columbia St.	***Overall Intersection***	15.0	15.0	B	0.98	LOS E	Y	200 75 205	200 (WBLTR) 100 (NBL) 225 (NBTR)
07	6th St. @ Washington St.	***Overall Intersection***	14.6	14.6	B	0.29	LOS E	Y	-	-
08	6th St. @ Main St.	***Overall Intersection***	8.6	8.6	A	0.79	LOS E	Y	75 185	100 (NBL) 200 (NBTR)
09	6th St. @ Broadway	Eastbound Left/Thru	1.7	1.7	A	0.25	LOS E	Y	-	-
10	6th St. @ C St.	Southbound Thru	3.7	3.7	A	0.36	LOS E	Y	-	-
11	8th St. @ Esther St.	Northbound Left/Thru/Right	7.3	7.3	A	0.27	LOS E	Y	-	-
12	8th St. @ Columbia St.	***Overall Intersection***	15.4	15.4	B	0.68	LOS E	Y	75 75 210	125 (SBL) 100 (WBL) 225 (WBTR)
13	8th St. @ Washington St.	***Overall Intersection***	11.9	11.9	B	0.54	LOS E	Y	-	-
14	8th St. @ Main St.	***Overall Intersection***	15.2	15.2	B	0.63	LOS E	Y	-	-
15	8th St. @ Broadway	***Overall Intersection***	7.0	7.0	A	0.63	LOS E	Y	-	-
16	8th St. @ C St.	***Overall Intersection***	11.2	11.2	B	0.52	LOS E	Y	-	-
17	9th St. @ Esther St.	Westbound Left/Thru/Right	5.9	5.9	A	0.07	LOS E	Y	-	-
18	9th St. @ Columbia St.	Westbound Left/Thru/Right	6.2	6.2	A	0.08	LOS E	Y	-	-
19	9th St. @ Washington St.	***Overall Intersection***	8.0	8.0	A	0.44	LOS E	Y	-	-
20	9th St. @ Main St.	Eastbound Left/Thru/Right	7.9	7.9	A	0.17	LOS E	Y	-	-
21	9th St. @ Broadway	***Overall Intersection***	3.6	3.6	A	0.35	LOS E	Y	-	-
22	Evergreen Blvd. @ Esther St.	Northbound Left/Thru/Right	10.5	10.5	B	0.23	LOS E	Y	-	-
23	Evergreen Blvd. @ Columbia St.	***Overall Intersection***	19.4	19.4	B	0.75	LOS E	Y	225 100 205	225 (WBTR) 125 (NBL) 225 (SBTR)
24	Evergreen Blvd. @ Washington St.	***Overall Intersection***	11.8	11.8	B	0.56	LOS E	Y	210	225 (SBTR)
25	Evergreen Blvd. @ Main St.	***Overall Intersection***	10.4	10.4	B	0.65	LOS E	Y	-	-
26	Evergreen Blvd. @ Broadway	***Overall Intersection***	10.3	10.3	B	0.52	LOS E	Y	-	-
27	Evergreen Blvd. @ C St.	***Overall Intersection***	11.5	11.5	B	0.68	LOS E	Y	-	-
28	11th St. @ Esther St.	Northbound Left/Thru/Right	4.8	4.8	A	0.14	LOS E	Y	-	-
29	11th St. @ Columbia St.	Eastbound Left/Thru/Right	15.6	15.6	C	0.25	LOS E	Y	-	-
30	11th St. @ Washington St.	***Overall Intersection***	10.1	10.1	B	0.46	LOS E	Y	-	-
31	11th St. @ Main St.	Westbound Left/Thru/Right	10.5	10.5	B	0.19	LOS E	Y	-	-
32	11th St. @ Broadway	***Overall Intersection***	10.1	10.1	B	0.40	LOS E	Y	-	-
33	11th St. @ C St.	Eastbound Left/Thru/Right	6.7	6.7	A	0.14	LOS E	Y	-	-
34	Mill Plain Blvd. @ Columbia St.	***Overall Intersection***	15.4	15.4	B	1.06	LOS E	Y	75 210	150 (SBL) 225 (SBT)
35	Mill Plain Blvd. @ Washington St.	***Overall Intersection***	17.7	17.7	B	0.50	LOS E	Y	205	225 (SBLT)
36	Mill Plain Blvd. @ Main St.	***Overall Intersection***	14.3	14.3	B	1.09	LOS E	Y	70 210	150 (SBL) 225 (SBT)
37	Mill Plain Blvd. @ Broadway	***Overall Intersection***	9.4	9.4	A	0.38	LOS E	Y	-	-
38	Mill Plain Blvd. @ C St.	***Overall Intersection***	12.8	12.8	B	1.02	LOS E	Y	200 75 200	200 (EBLTR) 125 (SBL) 200 (SBT)
39	Mill Plain Blvd. @ I-5 SB On-/Off-Ramps									
FF	Mill Plain Blvd. @ I-5 SPUI	***Overall Intersection***	22.1	22.1	C	0.63	LOS E	Y	-	-
40	Mill Plain Blvd. @ I-5 NB On-/Off-Ramps									
41	15th St. @ Columbia St.	***Overall Intersection***	22.5	22.5	C	1.06	LOS E	Y	225 75	225 (WBLTR) 75 (NBL)
42	15th St. @ Washington St.	***Overall Intersection***	7.4	7.4	A	0.56	LOS E	Y	70	75 (WBT)
GG	15th St. @ Mill District Park & Ride	Westbound Thru/Right	2.1	2.1	A	0.41	LOS E	Y	90	100 (WBTR)
43	15th St. @ Main St.	***Overall Intersection***	24.2	24.2	C	1.09	LOS E	Y	190 225	200 (WBT) 225 (SBTR)
44	15th St. @ Broadway	***Overall Intersection***	11.0	11.0	B	0.59	LOS E	Y	200	200 (WBTR)
45	15th St. @ C St.	***Overall Intersection***	47.1	47.1	D	1.02	LOS E	Y	-	-
D	16th St. @ Washington St.	***Overall Intersection***	21.6	21.6	C	0.30	LOS E	Y	65	75 (WBLTR)
HH	16th St. @ Mill District Park & Ride	Northbound Right	2.5	2.5	A	0.03	LOS E	Y	-	-
E	16th St. @ Main St.	***Overall Intersection***	12.8	12.8	B	0.49	LOS E	Y	180	200 (SBLTR)
F	17th Street & Washington	***Overall Intersection***	8.6	8.6	A	0.27	LOS E	Y	-	-
G	17th Street & Main	***Overall Intersection***	4.1	4.1	A	0.50	LOS E	Y	-	-
H	17th Street & Broadway	***Overall Intersection***	9.2	9.2	A	0.15	LOS E	Y	-	-
I	17th Street & C Street	***Overall Intersection***	8.0	8.0	A	0.23	LOS E	Y	-	-
J	17th Street & G Street	***Overall Intersection***	6.0	6.0	A	0.13	LOS E	Y	-	-
46	McLoughlin Blvd. @ Columbia St.	***Overall Intersection***	11.8	11.8	B	0.65	LOS E	Y	-	-
K	McLoughlin Blvd. @ Washington St.	***Overall Intersection***	9.1	9.1	A	0.52	LOS E	Y	-	-
47	McLoughlin Blvd. @ Main St.	***Overall Intersection***	21.2	21.2	C	0.83	LOS E	Y	220 50	225 (WBLTR) 100 (SBR)
48	McLoughlin Blvd. @ Broadway	***Overall Intersection***	23.7	23.7	C	0.54	LOS E	Y	200	200 (WBT)
L	McLoughlin Blvd. @ C St.	***Overall Intersection***	11.3	11.3	B	0.49	LOS E	Y	-	-
M	McLoughlin Blvd. @ G St.	Southbound Left/Thru/Right	5.5	5.5	A	-	LOS E	Y	-	-
II	McLoughlin Blvd. @ Clark College Park & Ride	***Overall Intersection***	10.3	10.3	B	0.33	LOS D	Y	-	-
JJ	McLoughlin Blvd. @ Marshall CC East	***Overall Intersection***	1.9	1.9	A	0.30	LOS D	Y	-	-
49	McLoughlin Blvd. @ Fort Vancouver Way	***Overall Intersection***	15.4	15.4	B	0.55	LOS D	Y	-	-
50	24th St. @ Columbia St.	Eastbound Left/Thru/Right	7.9	7.9	A	0.03	LOS E	Y	-	-
51	24th St. @ Main St.	Eastbound Left/Right	7.8	7.8	A	0.04	LOS E	Y	-	-
52	4th Plain Blvd. @ Columbia St.	***Overall Intersection***	16.5	16.5	B	0.64	LOS D	Y	235	250 (SBTR)
53	4th Plain Blvd. @ Main St.	***Overall Intersection***	49.5	49.5	D	0.72	LOS D	Y	170 195 75 75 470	225 (WBL) 200 (WBTR) 75 (NBR) 125 (SBL) 475 (SBTR)
54	4th Plain Blvd. @ Broadway	***Overall Intersection***	42.9	42.9	D	0.60	LOS D	Y	495 195	500 (WBTR) 200 (SBLTR)
55	4th Plain Blvd. @ F St.	***Overall Intersection***	10.0	10.0	A	0.55	LOS D	Y	150	150 (EBT)
56	4th Plain Blvd. @ I-5 SB On-/Off-Ramps	***Overall Intersection***	21.9	21.9	C	0.58	LOS D	Y	200	250 (EBL)
57	4th Plain Blvd. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	19.9	19.9	B	0.51	LOS D	Y	-	-
58	4th Plain Blvd. @ Post Cemetery	Eastbound Left	6.7	6.7	A	0.01	LOS E	Y	-	-
59	4th Plain Blvd. @ St. Johns Blvd.	***Overall Intersection***	17.5	17.5	B	0.43	LOS D	Y	-	-
60	28th St. @ Main St.	Eastbound Left/Thru/Right	520.0	> 100	F	0.23	LOS E	Y**	325 215	325 (EBLTR) 225 (SBTR)
61	28th St. @ Broadway	Westbound Left	4.2	4.2	A	0.11	LOS E	Y	-	-
62	29th St. @ Main St./Broadway	Westbound Left/Thru/Right	264.8	> 100	F	-	LOS E	N	1050	1050 (SBTR)
63	33rd St. @ Main St.	***Overall Intersection***	21.6	21.6	C	0.57	LOS D	Y	50	75 (WBL)

Continued on next page

Exhibit 4-28

Vancouver Intersection Performance Results

AM Peak Hour

2005 Existing Conditions

#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)
64	39th St. @ Main St.	***Overall Intersection***	28.5	C	0.69	LOS D	Y	75 75 215 125	125 (EBL) 125 (WBL) 225 (WBTR) 175 (SBL)
65	39th St. @ F St.	Southbound Left/Thru/Right	22.6	C	0.12	LOS E	Y	50	75 (WBL)
66	39th St. @ H St.	***Overall Intersection***	8.2	A	0.54	LOS D	Y	135	150 (WBTR)
67	39th St. @ I-5 SB On-/Off-Ramps	Northbound Left	68.0	F	1.55	LOS E	N	1660 125	600 (NBL) 200 (NBR)
68	39th St. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	11.9	B	0.59	LOS D	Y	-	-
69	WSDOT/40th St. @ Main St.	***Overall Intersection***	4.5	A	0.44	LOS D	Y	-	-
70	45th St. @ Main St.	***Overall Intersection***	7.4	A	0.44	LOS D	Y	-	-
71	Hazel Dell @ Main St. (West)	***Overall Intersection***	9.7	A	0.50	LOS D	Y	-	-
72	Ross St. @ Main St.	***Overall Intersection***	4.6	A	0.29	LOS D	Y	-	-
73	Ross St. @ North Rd.	Northbound Left/Thru	6.0	A	0.24	LOS E	Y	-	-

2030 No-Build

#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)
64	39th St. @ Main St.	***Overall Intersection***	> 100	F	0.93	LOS D	N	75 1310 75 215 75 125 360	125 (EBL) 1325 (EBTR) 125 (WBL) 225 (WBTR) 125 (NBL) 200 (SBL) 375 (SBT)
65	39th St. @ F St.	Northbound Left/Thru/Right	> 100	F	0.12	LOS E	N	50 430	75 (WBL) 450 (WBTR)
66	39th St. @ H St.	***Overall Intersection***	26.0	C	0.66	LOS D	Y	135	150 (WBTR)
67	39th St. @ I-5 SB On-/Off-Ramps	***Overall Intersection***	64.4	E	0.60	LOS D	N	135 55 275 715 1660 125	150 (EBT) 100 (EBR) 375 (WBL) 725 (WBT) 1675 (NBL) 275 (NBR)
68	39th St. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	> 100	F	0.80	LOS D	N	300 715 1170 790 75	325 (EBL) 725 (EBT) 1175 (WBTR) 800 (NBLT) 75 (NBR)
69	WSDOT/40th St. @ Main St.	***Overall Intersection***	21.5	C	0.57	LOS D	Y	-	-
70	45th St. @ Main St.	***Overall Intersection***	9.4	A	0.64	LOS D	Y	-	-
71	Hazel Dell @ Main St. (West)	***Overall Intersection***	13.9	B	0.71	LOS D	Y	-	-
72	Ross St. @ Main St.	***Overall Intersection***	6.7	A	0.47	LOS D	Y	60	75 (WBL)
73	Ross St. @ North Rd.	Northbound Left/Thru	7.2	A	0.39	LOS E	Y	-	-

2030 LPA with Highway Phasing (Broadway-Washington/17th)

#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)
64	39th St. @ Main St.	***Overall Intersection***	> 100	F	0.96	LOS D	Y**	75 1310 75 215 75 125 360	175 (EBL) 1325 (EBTR) 250 (WBL) 225 (WBTR) 125 (NBL) 225 (SBL) 375 (SBTR)
65	39th St. @ F St.	Westbound Thru/Right	33.9	D	0.57	LOS E	Y	215 435	225 (EBTR) 450 (WBTR)
66	39th St. @ H St.	***Overall Intersection***	69.4	E	0.79	LOS D	N	430 135	450 (EBTR) 150 (WBTR)
67	39th St. @ I-5 SB On-/Off-Ramps	***Overall Intersection***	30.2	C	0.96	LOS D	Y	135 55 730 130	150 (EBT) 125 (EBR) 750 (WBT) 225 (NBLR)
68	39th St. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	> 100	F	1.05	LOS D	Y**	300 1175 790	375 (EBL) 1175 (WBT) 925 (NBL)
69	WSDOT/40th St. @ Main St.	***Overall Intersection***	40.6	D	0.47	LOS D	Y	150	200 (SBL)
70	45th St. @ Main St.	***Overall Intersection***	19.4	B	0.54	LOS D	Y	-	-
71	Hazel Dell @ Main St. (West)	***Overall Intersection***	11.8	B	0.61	LOS D	Y	205	225 (SBLT)
72	Ross St. @ Main St.	***Overall Intersection***	8.6	A	0.52	LOS D	Y	60	75 (WBL)
73	Ross St. @ North Rd.	Northbound Left/Thru	7.7	A	0.41	LOS E	Y	-	-

2030 LPA (Broadway-Washington/17th)

#	Intersection	Approach/Movement	Delay (Seconds)	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)
64	39th St. @ Main St.	***Overall Intersection***	76.9	76.9	E	0.90	LOS D	Y*	75 1310 75 215 75 125 360	175 (EBL) 1325 (EBTR) 225 (WBL) 225 (WBTR) 125 (NBL) 200 (SBL) 350 (SBT)
65	39th St. @ F St.	Westbound Thru/Right	33.3	33.3	D	0.56	LOS E	Y	435	450 (WBTR)
66	39th St. @ H St.	***Overall Intersection***	18.4	18.4	B	0.78	LOS D	Y	135	150 (WBTR)
67	39th St. @ I-5 SB On-/Off-Ramps	Westbound Thru	36.7	36.7	E	0.64	LOS E	Y	55 730	100 (EBR) 750 (WBT)
68	39th St. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	72.8	72.8	E	0.72	LOS D	Y*	1175 790	1175 (WBT) 800 (NBL)
69	WSDOT/40th St. @ Main St.	***Overall Intersection***	29.3	29.3	C	0.47	LOS D	Y	150	175 (SBL)
70	45th St. @ Main St.	***Overall Intersection***	11.6	11.6	B	0.54	LOS D	Y	-	-
71	Hazel Dell @ Main St. (West)	***Overall Intersection***	11.5	11.5 > 100	B -	0.61	LOS D	Y	205	225 (SBLT)
72	Ross St. @ Main St.	***Overall Intersection***	8.4	8.4	A	0.52	LOS D	Y	60	75 (WBL)
73	Ross St. @ North Rd.	Northbound Left/Thru	7.0	7.0	A	0.41	LOS E	Y	-	-

(yellow)	Delay / LOS affected by freeway congestion
(blue)	Intersection queuing spills back into upstream intersection
Note 1	The ICU is used for overall intersections (signalized and unsignalized). The V/C is used for the identified movement(s) at unsignalized intersections.
Note 2	The 2003 Vancouver Concurrency Administration Manual designates an acceptable LOS standard of LOS E for downtown and LOS D for all other intersections.
Note 3	2030 LPA and LPA Phase I Roundabout intersection operations taken from VISSIM analysis
*	Intersection not modeled in existing conditions scenario
Y*	Intersection does not meet standard in the Build scenario, but meets the "do no worse" criteria as compared to the No Build.
Y**	Intersection operations are no worse than No Build, and no mitigation is required.

Exhibit 4-29

Vancouver Intersection Performance Results

PM Peak Hour — 2005 Existing Conditions

#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)
A	Esther St. @ Columbia Way								
B	Columbia St. @ Columbia Way[3]								
AA	Main St. @ Columbia Way[3]								
01	3rd/4th St. @ Columbia St[3]	Westbound Left/Right	4.7	A	0.05	LOS E	Y	-	-
BB	SR 14 and Main Street[3]								
CC	SR 14 Park and Ride @ Main Street								
C	3rd/4th St. @ Esther St.								
02	4th St. @ Columbia St.	Westbound Left/Thru/Right	4.8	A	0.05	LOS E	Y	-	-
03	4th St. @ Washington St.	Eastbound Right	1.6	A	0.01	LOS E	Y	-	-
04	5th St. @ Columbia St.	Southbound Left	3.6	A	0.22	LOS E	Y	-	-
DD	5th St. @ Columbia Park and Ride								
05	5th St. @ Washington St.	***Overall Intersection***	8.1	A	0.34	LOS E	Y	-	-
EE	5th St. @ Main St.								
06	6th St. @ Columbia St.	***Overall Intersection***	10.7	B	0.42	LOS E	Y	-	-
07	6th St. @ Washington St.	***Overall Intersection***	11.6	B	0.36	LOS E	Y	-	-
08	6th St. @ Main St.	***Overall Intersection***	5.3	A	0.43	LOS E	Y	-	-
09	6th St. @ Broadway	Southbound Right	4.6	A	0.22	LOS E	Y	-	-
10	6th St. @ C St.	Northbound Left/Thru	2.1	A	-	LOS E	Y	-	-
11	8th St. @ Esther St.	Northbound Left/Thru/Right	8.0	A	0.31	LOS E	Y	-	-
12	8th St. @ Columbia St.	***Overall Intersection***	15.1	B	0.74	LOS E	Y	-	-
13	8th St. @ Washington St.	***Overall Intersection***	9.5	A	0.58	LOS E	Y	75	125 (WBL)
14	8th St. @ Main St.	***Overall Intersection***	17.0	B	0.58	LOS E	Y	-	-
15	8th St. @ Broadway	Southbound Thru/Right	10.2	B	0.13	LOS E	Y	-	-
16	8th St. @ C St.	***Overall Intersection***	14.3	B	0.34	LOS E	Y	-	-
17	9th St. @ Esther St.	Westbound Left/Thru/Right	4.5	A	0.07	LOS E	Y	-	-
18	9th St. @ Columbia St.	Westbound Left/Thru/Right	6.3	A	0.18	LOS E	Y	-	-
19	9th St. @ Washington St.	Westbound Thru	8.5	A	0.08	LOS E	Y	-	-
20	9th St. @ Main St.	Northbound Thru	6.7	A	0.34	LOS E	Y	50	50 (NBL)
21	9th St. @ Broadway	Southbound Thru/Right	6.2	A	0.24	LOS E	Y	-	-
22	Evergreen Blvd. @ Esther St.	Southbound Left/Thru/Right	6.6	A	0.14	LOS E	Y	-	-
23	Evergreen Blvd. @ Columbia St.	***Overall Intersection***	10.9	B	0.53	LOS E	Y	-	-
24	Evergreen Blvd. @ Washington St.	***Overall Intersection***	10.5	B	0.56	LOS E	Y	-	-
25	Evergreen Blvd. @ Main St.	***Overall Intersection***	9.7	A	0.56	LOS E	Y	-	-
26	Evergreen Blvd. @ Broadway	***Overall Intersection***	12.7	B	0.56	LOS E	Y	210	225 (SBTR)
27	Evergreen Blvd. @ C St.	***Overall Intersection***	13.0	B	0.56	LOS E	Y	-	-
28	11th St. @ Esther St.	Northbound Left/Thru/Right	6.3	A	0.11	LOS E	Y	-	-
29	11th St. @ Columbia St.	Eastbound Left/Thru/Right	8.9	A	0.34	LOS E	Y	-	-
30	11th St. @ Washington St.	Eastbound Thru/Right	7.0	A	0.21	LOS E	Y	-	-
31	11th St. @ Main St.	Eastbound Thru/Right	7.5	A	0.41	LOS E	Y	-	-
32	11th St. @ Broadway	Eastbound Thru/Right	6.2	A	0.19	LOS E	Y	-	-
33	11th St. @ C St.	Eastbound Left/Thru	7.8	A	0.18	LOS E	Y	-	-
34	Mill Plain Blvd. @ Columbia St.	***Overall Intersection***	14.7	B	0.75	LOS E	Y	-	-
35	Mill Plain Blvd. @ Washington St.	***Overall Intersection***	8.2	A	0.45	LOS E	Y	-	-
36	Mill Plain Blvd. @ Main St.	***Overall Intersection***	12.4	B	0.62	LOS E	Y	100	150 (NBR)
37	Mill Plain Blvd. @ Broadway	***Overall Intersection***	16.6	B	0.70	LOS E	Y	-	-
38	Mill Plain Blvd. @ C St.	***Overall Intersection***	14.1	B	0.60	LOS E	Y	-	-
39	Mill Plain Blvd. @ I-5 SB On-/Off-Ramps	***Overall Intersection***	37.5	D	0.72	LOS E	Y	275	350 (WBL)
FF	Mill Plain Blvd. @ I-5 SPUI								
40	Mill Plain Blvd. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	26.8	C	0.86	LOS E	Y	610 610 75	725 (EBL) 625 (EBT) 125 (WBR)
41	15th St. @ Columbia St.	***Overall Intersection***	9.0	A	0.54	LOS E	Y	-	-
42	15th St. @ Washington St.	***Overall Intersection***	5.6	A	0.37	LOS E	Y	-	-
GG	15th St. @ Mill District Park & Ride								
43	15th St. @ Main St.	***Overall Intersection***	9.0	A	0.59	LOS E	Y	-	-
44	15th St. @ Broadway	***Overall Intersection***	24.8	C	0.43	LOS E	Y	210	250 (WBL)
45	15th St. @ C St.	***Overall Intersection***	6.7	A	0.41	LOS E	Y	-	-
D	16th St. @ Washington St.								
HH	16th St. @ Mill District Park & Ride								
E	16th St. @ Main St.								
F	17th Street & Washington								
G	17th Street & Main								
H	17th Street & Broadway								
I	17th Street & C Street								
J	17th Street & G Street								
46	McLoughlin Blvd. @ Columbia St.	***Overall Intersection***	6.4	A	0.42	LOS E	Y	-	-
K	McLoughlin Blvd. @ Washington St.								
47	McLoughlin Blvd. @ Main St.	***Overall Intersection***	11.6	B	0.67	LOS E	Y	-	-
48	McLoughlin Blvd. @ Broadway	***Overall Intersection***	7.8	A	0.39	LOS E	Y	-	-
L	McLoughlin Blvd. @ C St.								
M	McLoughlin Blvd. @ G St.								
II	McLoughlin Blvd. @ Clark College Park & Ride								
JJ	McLoughlin Blvd. @ Marshall CC East								
49	McLoughlin Blvd. @ Fort Vancouver Way	***Overall Intersection***	12.6	B	0.43	LOS D	Y	-	-

PM Peak Hour — 2030 No-Build

#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)
A	Esther St. @ Columbia Way	Eastbound Left	6.2	A	0.08	LOS E	Y	-	-
B	Columbia St. @ Columbia Way[3]	Eastbound Left	6.0	A	0.07	LOS E	Y	-	-
AA	Main St. @ Columbia Way[3]								
01	3rd/4th St. @ Columbia St[3]	Eastbound Left/Right	6.7	A	0.16	LOS E	Y	-	-
BB	SR 14 and Main Street[3]								
CC	SR 14 Park and Ride @ Main Street								
C	3rd/4th St. @ Esther St.	Westbound Left/Right	3.1	A	0.01	LOS E	Y	-	-
02	4th St. @ Columbia St.	Northbound Thru/Right	0.4	A	0.21	LOS E	Y	-	-
03	4th St. @ Washington St.	Eastbound Right	2.7	A	0.01	LOS E	Y	-	-
04	5th St. @ Columbia St.	Southbound Left	9.1	A	0.41	LOS E	Y	90	125 (SBL)
DD	5th St. @ Columbia Park and Ride								
05	5th St. @ Washington St.	***Overall Intersection***	13.4	B	0.54	LOS E	Y	180 210	200 (EBR to SR-14) 225 (SBT)
EE	5th St. @ Main St.								
06	6th St. @ Columbia St.	***Overall Intersection***	13.1	B	0.69	LOS E	Y	-	-
07	6th St. @ Washington St.	***Overall Intersection***	15.2	B	0.57	LOS E	Y	-	-
08	6th St. @ Main St.	***Overall Intersection***	6.5	A	0.60	LOS E	Y	-	-
09	6th St. @ Broadway	Southbound Right	4.7	A	0.22	LOS E	Y	-	-
10	6th St. @ C St.	Northbound Left/Thru	2.9	A	0.30	LOS E	Y	-	-
11	8th St. @ Esther St.	Northbound Left/Thru/Right	14.6	B	0.50	LOS E	Y	-	-
12	8th St. @ Columbia St.	***Overall Intersection***	21.6	C	1.10	LOS E	Y	215	225 (SBLTR)
13	8th St. @ Washington St.	***Overall Intersection***	10.2	B	0.56	LOS E	Y	-	-
14	8th St. @ Main St.	***Overall Intersection***	13.5	B	0.58	LOS E	Y	-	-
15	8th St. @ Broadway	Southbound Left/Thru/Right	8.1	A	0.38	LOS E	Y	-	-
16	8th St. @ C St.	***Overall Intersection***	15.3	B	0.42	LOS E	Y	-	-
17	9th St. @ Esther St.	Eastbound Left/Thru/Right	3.7	A	0.02	LOS E	Y	-	-
18	9th St. @ Columbia St.	Eastbound Left/Thru/Right	13.8	B	0.14	LOS E	Y	-	-
19	9th St. @ Washington St.	Westbound Thru	7.2	A	0.08	LOS E	Y	-	-
20	9th St. @ Main St.	Eastbound Left/Thru/Right	6.0	A	0.06	LOS E	Y	-	-
21	9th St. @ Broadway	Eastbound Left/Right	4.0	A	0.04	LOS E	Y	-	-
22	Evergreen Blvd. @ Esther St.	Southbound Left/Thru/Right	6.4	A	0.12	LOS E	Y	-	-
23	Evergreen Blvd. @ Columbia St.	***Overall Intersection***	18.4	B	0.59	LOS E	Y	225	225 (NBTR)
24	Evergreen Blvd. @ Washington St.	***Overall Intersection***	13.2	B	0.55	LOS E	Y	-	-
25	Evergreen Blvd. @ Main St.	***Overall Intersection***	13.1	B	0.55	LOS E	Y	-	-
26	Evergreen Blvd. @ Broadway	***Overall Intersection***	10.0	A	0.54	LOS E	Y	-	-
27	Evergreen Blvd. @ C St.	***Overall Intersection***	16.8	B	0.63	LOS E	Y	75	100 (EBL)
28	11th St. @ Esther St.	Northbound Left/Thru/Right	5.8	A	0.11	LOS E	Y	-	-
29	11th St. @ Columbia St.	Eastbound Left/Thru/Right	11.6	B	0.34	LOS E	Y	-	-
30	11th St. @ Washington St.	Eastbound Thru/Right	7.4	A	0.17	LOS E	Y	-	-
31	11th St. @ Main St.	Eastbound Left/Thru/Right	15.6	C	0.31	LOS E	Y	-	-
32	11th St. @ Broadway	Westbound Left/Thru/Right	6.7	A	0.30	LOS E	Y	-	-
33	11th St. @ C St.	Westbound Right	11.1	B	0.19	LOS E	Y	-	-
34	Mill Plain Blvd. @ Columbia St.	***Overall Intersection***	> 100	F	0.75	LOS E	N	810 150 75	825 (EBLTR) 225 (NBR) 100 (SBL)
35	Mill Plain Blvd. @ Washington St.	***Overall Intersection***	54.6	D	0.57	LOS E	Y	215	225 (EBTR)
36	Mill Plain Blvd. @ Main St.	***Overall Intersection***	78.5	E	0.79	LOS E	Y	210 765 70	225 (EBT) 775 (NBTR) 100 (SBL)
37	Mill Plain Blvd. @ Broadway	***Overall Intersection***	39.9	D	0.77	LOS E	Y	210 70	225 (EBT) 100 (SBL)
38	Mill Plain Blvd. @ C St.	***Overall Intersection***	51.9	D	0.78	LOS E	Y	205	225 (EBT)
39	Mill Plain Blvd. @ I-5 SB On-/Off-Ramps	***Overall Intersection***	94.4	F	0.87	LOS E	N	795 350 275 610	800 (EBT) 525 (EBR) 400 (WBL) 625 (WBT)
FF	Mill Plain Blvd. @ I-5 SPUI								
40	Mill Plain Blvd. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	36.5	D	0.97	LOS E	Y	450 75	450 (WBT) 150 (WBR)
41	15th St. @ Columbia St.	***Overall Intersection***	8.3	A	0.75	LOS E	Y	-	-
42	15th St. @ Washington St.	***Overall Intersection***	10.1	B	0.43	LOS E	Y	-	-
GG	15th St. @ Mill District Park & Ride								
43	15th St. @ Main St.	***Overall Intersection***	8.8	A	0.79	LOS E	Y	-	-
44	15th St. @ Broadway	***Overall Intersection***	8.3	A	0.77	LOS E	Y	70 25	100 (NBL) 75 (SBR)
45	15th St. @ C St.	***Overall Intersection***	12.1	B	0.50	LOS E	Y	-	-
D	16th St. @ Washington St.	Westbound Left/Thru	6.1	A	0.19	LOS E	Y	-	-
HH	16th St. @ Mill District Park & Ride								
E	16th St. @ Main St.	Eastbound Left/Thru/Right	8.1	A	0.24	LOS E	Y	-	-
F	17th Street & Washington	Westbound Left/Thru	5.6	A	0.06	LOS E	Y	-	-
G	17th Street & Main	Westbound Left/Thru/Right	8.6	A	0.15	LOS E	Y	-	-
H	17th Street & Broadway	Eastbound Left/Thru/Right	7.1	A	0.14	LOS E	Y	-	-
I	17th Street & C Street	Eastbound Left/Thru	6.1	A	0.14	LOS E	Y	-	-
J	17th Street & G Street	Southbound Left/Thru/Right	3.4	A	0.03	LOS E	Y	-	-
46	McLoughlin Blvd. @ Columbia St.	***Overall Intersection***	12.1	B	0.61	LOS E	Y	-	-
K	McLoughlin Blvd. @ Washington St.	***Overall Intersection***	5.9	A	0.50	LOS E	Y	-	-
47	McLoughlin Blvd. @ Main St.	***Overall Intersection***	15.7	B	0.76	LOS E	Y	-	-
48	McLoughlin Blvd. @ Broadway	***Overall Intersection***	12.0	B	0.50	LOS E	Y	-	-
L	McLoughlin Blvd. @ C St.	***Overall Intersection***	9.0	A	0.30	LOS E	Y	-	-
M	McLoughlin Blvd. @ G St.	Northbound Left/Thru/Right	5.8	A	-	LOS E	Y	-	-
II	McLoughlin Blvd. @ Clark College Park & Ride								
JJ	McLoughlin Blvd. @ Marshall CC East								
49	McLoughlin Blvd. @ Fort Vancouver Way	***Overall Intersection***	12.5	B	0.42	LOS D	Y	-	-

PM Peak Hour — 2030 LPA with Highway Phasing (Broadway-Washington/17th)

#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)
A	Esther St. @ Columbia Way	Southbound Left/Right	8.7	A	0.42	LOS E	Y	-	-
B	Columbia St. @ Columbia Way[3]	Southbound Left/Right	2.2	A	0.40	LOS E	Y	-	-
AA	Main St. @ Columbia Way[3]	Eastbound Left/Thru	1.2	A	0.20	LOS E	Y	-	-
01	3rd/4th St. @ Columbia St[3]	Southbound Left/Thru/Right	4.9	A	0.73	LOS E	Y	-	-
BB	SR 14 and Main Street[3]	Eastbound Left/Thru/Right	14.1	B	0.79	LOS E	Y	-	-
CC	SR 14 Park and Ride @ Main Street	Eastbound Left/Right	8.2	A	0.03	LOS E	Y	-	-
C	3rd/4th St. @ Esther St.	Westbound Left/Right	6.0	A	0.13	LOS E	Y	-	-
02	4th St. @ Columbia St.								
03	4th St. @ Washington St.								
04	5th St. @ Columbia St.	Westbound Left/Right	3.6	A	0.04	LOS E	Y	-	-
DD	5th St. @ Columbia Park and Ride	Northbound Left/Right	3.9	A	0.23	LOS E	Y	-	-
05	5th St. @ Washington St.	***Overall Intersection***	9.7	A	0.32	LOS E	Y	85	100 (EBTR)
EE	5th St. @ Main St.	***Overall Intersection***	12.7	B	0.60	LOS E	Y	175	175 (SBTR)
06	6th St. @ Columbia St.	***Overall Intersection***	22.2	C	0.85	LOS E	Y	200 205 75	200 (WBLTR) 225 (NBTR) 75 (SBL)
07	6th St. @ Washington St.	***Overall Intersection***	4.7	A	0.33	LOS E	Y	-	-
08	6th St. @ Main St.	***Overall Intersection***	14.4	B	0.70	LOS E	Y	165 220	175 (NBLTR) 225 (SBLTR)
09	6th St. @ Broadway	Eastbound Left/Thru	2.0	A	0.21	LOS E	Y	-	-
10	6th St. @ C St.	Southbound Thru	5.8	A	0.84	LOS E	Y	-	-
11	8th St. @ Esther St.	Northbound Left/Thru/Right	14.3	B	0.35	LOS E	Y	-	-
12	8th St. @ Columbia St.	***Overall Intersection***	30.2	C	0.75	LOS E	Y	150 75 75	200 (EBL) 125 (WBL) 125 (SBL)
13	8th St. @ Washington St.	***Overall Intersection***	12.8	B	0.56	LOS E	Y	-	-
14	8th St. @ Main St.	***Overall Intersection***	24.2	C	0.74	LOS E	Y	75 200 75 215 215	125 (EBL) 200 (EBTR) 125 (WBL) 225 (NBLTR) 225 (SBLTR)
15	8th St. @ Broadway	***Overall Intersection***	23.0	C	0.64	LOS E	Y	-	-
16	8th St. @ C St.	***Overall Intersection***	12.3	B	0.70	LOS E	Y	-	-
17	9th St. @ Esther St.	Westbound Left/Thru/Right	5.1	A	0.06	LOS E	Y	-	-
18	9th St. @ Columbia St.	Eastbound Left/Thru/Right	15.9	C	0.34	LOS E	Y	-	-
19	9th St. @ Washington St.	***Overall Intersection***	11.2	B	0.40	LOS E	Y	-	-
20	9th St. @ Main St.	Eastbound Left/Thru/Right	18.0	C	0.36	LOS E	Y	-	-
21	9th St. @ Broadway	***Overall Intersection***	26.7	C	0.37	LOS E	Y	-	-
22	Evergreen Blvd. @ Esther St.	Northbound Left/Thru/Right	9.7	A	0.22	LOS E	Y	-	-
23	Evergreen Blvd. @ Columbia St.	***Overall Intersection***	28.8	C	0.71	LOS E	Y	100 220 205	125 (EBL) 225 (NBTR) 225 (SBTR)
24	Evergreen Blvd. @ Washington St.	***Overall Intersection***	19.6	B	0.61	LOS E	Y	225 210	225 (EBTR) 225 (SBLTR)
25	Evergreen Blvd. @ Main St.	***Overall Intersection***	29.3	C	0.74	LOS E	Y	75 210 75 215	125 (EBL) 300 (EBTR) 125 (WBL) 225 (NBLTR)
26	Evergreen Blvd. @ Broadway	***Overall Intersection***	19.3	B	0.66	LOS E	Y	100 210 220	150 (EBL) 225 (EBTR) 225 (NBLTR)
27	Evergreen Blvd. @ C St.	***Overall Intersection***	28.2	C	0.77	LOS E	Y	75 200 150 100 210	150 (EBL) 200 (EBTR) 175 (WBL) 125 (SBL) 225 (SBTR)
28	11th St. @ Esther St.	Northbound Left/Thru/Right	6.2	A	0.10	LOS E	Y	-	-
29	11th St. @ Columbia St.	Eastbound Left/Thru/Right	12.1	B	0.38	LOS E	Y	-	-
30	11th St. @ Washington St.	***Overall Intersection***	11.5	B	0.44	LOS E	Y	-	-
31	11th St. @ Main St.	Eastbound Left/Thru/Right	12.0	B	0.50	LOS E	Y	-	-
32	11th St. @ Broadway	***Overall Intersection***	11.7	B	0.47	LOS E	Y	-	-
33	11th St. @ C St.	Eastbound Left/Thru/Right	21.9	C	0.24	LOS E	Y	-	-
34	Mill Plain Blvd. @ Columbia St.	***Overall Intersection***	> 100	F	1.10	LOS E	Y**	810 200 150	825 (EBLTR) 200 (NBT) 175 (NBR)
35	Mill Plain Blvd. @ Washington St.	***Overall Intersection***	46.6	D	0.61	LOS E	Y	235	250 (EBTR)
36	Mill Plain Blvd. @ Main St.	***Overall Intersection***	37.9	D	0.71	LOS E	Y	205 100 70	225 (EBLTR) 150 (NBR) 150 (SBL)
37	Mill Plain Blvd. @ Broadway	***Overall Intersection***	44.0	D	0.71	LOS E	Y	210 210	225 (EBLT) 225 (NBTR)
38	Mill Plain Blvd. @ C St.	***Overall Intersection***	81.4	F	1.35	LOS E	N	200 215 75 195	200 (EBLTR) 225 (NBTR) 100 (SBL) 200 (SBT)
39	Mill Plain Blvd. @ I-5 SB On-/Off-Ramps								
FF	Mill Plain Blvd. @ I-5 SPUI	***Overall Intersection***	63.3	E	0.99	LOS E	Y	700 700 740 200	800 (EBL) 850 (EBT) 750 (WBT) 275 (WBR)
40	Mill Plain Blvd. @ I-5 NB On-/Off-Ramps								
41	15th St. @ Columbia St.	***Overall Intersection***	12.0	B	1.10	LOS E	Y	-	-
42	15th St. @ Washington St.	***Overall Intersection***	6.4	A	0.52	LOS E	Y	60	75 (WBT)
GG	15th St. @ Mill District Park & Ride	Westbound Thru/Right	0.9	A	0.34	LOS E	Y	-	-
43	15th St. @ Main St.	***Overall Intersection***	9.5	A	0.71	LOS E	Y	70	75 (NBL)
44	15th St. @ Broadway	***Overall Intersection***	6.5	A	0.54	LOS E	Y	-	-
45	15th St. @ C St.	***Overall Intersection***	> 100	F	1.35	LOS E	N	-	-
D	16th St. @ Washington St.	***Overall Intersection***	23.5	C	0.29	LOS E	Y	65	75 (WBLT)
HH	16th St. @ Mill District Park & Ride	Northbound Right	3.9	A	0.15	LOS E	Y	-	-
E	16th St. @ Main St.	***Overall Intersection***	11.2	B	0.61	LOS E	Y	85	100 (EBLTR)
F	17th Street & Washington	***Overall Intersection***	10.4	B	0.26	LOS E	Y	-	-
G	17th Street & Main	***Overall Intersection***	8.3	A	0.35	LOS E	Y	-	-
H	17th Street & Broadway	***Overall Intersection***	8.4	A	0.18	LOS E	Y	-	-
I	17th Street & C Street	***Overall Intersection***	15.0	B	0.23	LOS E	Y	-	-
J	17th Street & G Street	***Overall Intersection***	4.5	A	0.13	LOS E	Y	-	-
46	McLoughlin Blvd. @ Columbia St.	***Overall Intersection***	19.0	B	0.60	LOS E	Y	-	-
K	McLoughlin Blvd. @ Washington St.	***Overall Intersection***	6.5	A	0.53	LOS E	Y	-	-
47	McLoughlin Blvd. @ Main St.	***Overall Intersection***	14.4	B	0.87	LOS E	Y	200 50	200 (NBLTR) 100 (SBR)
48	McLoughlin Blvd. @ Broadway	***Overall Intersection***	12.9	B	0.61	LOS E	Y	75	125 (EBL)
L	McLoughlin Blvd. @ C St.	***Overall Intersection***	8.5	A	0.45	LOS E	Y	-	-
M	McLoughlin Blvd. @ G St.	Southbound Left/Thru/Right	6.5	A	-	LOS E	Y	-	-
II	McLoughlin Blvd. @ Clark College Park & Ride	***Overall Intersection***	8.7	A	0.38	LOS D	Y	-	-
JJ	McLoughlin Blvd. @ Marshall CC East	***Overall Intersection***	8.1	A	0.32	LOS D	Y	-	-
49	McLoughlin Blvd. @ Fort Vancouver Way	***Overall Intersection***	15.4	B	0.55	LOS D	Y	-	-

PM Peak Hour — 2030 LPA (Broadway-Washington/17th)

#	Intersection	Approach/Movement	Delay (Seconds)	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)
A	Esther St. @ Columbia Way	Southbound Left/Right	8.7	8.7	A	0.42	LOS E	Y	-	-
B	Columbia St. @ Columbia Way[3]	Southbound Left/Right	2.2	2.2	A	0.40	LOS E	Y	-	-
AA	Main St. @ Columbia Way[3]	Eastbound Left/Thru	1.2	1.2	A	0.20	LOS E	Y	-	-
01	3rd/4th St. @ Columbia St[3]	Southbound Left/Thru/Right	4.9	4.9	A	0.73	LOS E	Y	-	-
BB	SR 14 and Main Street[3]	Eastbound Left/Thru/Right	14.1	14.1	B	0.79	LOS E	Y	-	-
CC	SR 14 Park and Ride @ Main Street	Eastbound Left/Right	8.2	8.2	A	0.03	LOS E	Y	-	-
C	3rd/4th St. @ Esther St.	Westbound Left/Right	6.0	6.0	A	0.13	LOS E	Y	-	-
02	4th St. @ Columbia St.									
03	4th St. @ Washington St.									
04	5th St. @ Columbia St.	Westbound Left/Right	3.6	3.6	A	0.04	LOS E	Y	-	-
DD	5th St. @ Columbia Park and Ride	Northbound Left/Right	3.9	3.9	A	0.23	LOS E	Y	-	-
05	5th St. @ Washington St.	***Overall Intersection***	9.7	9.7	A	0.32	LOS E	Y	85	100 (EBTR)
EE	5th St. @ Main St.	***Overall Intersection***	12.7	12.7	B	0.60	LOS E	Y	175	175 (SBTR)
06	6th St. @ Columbia St.	***Overall Intersection***	22.2	22.2	C	0.85	LOS E	Y	200 205 75	200 (WBLTR) 225 (NBTR) 75 (SBL)
07	6th St. @ Washington St.	***Overall Intersection***	4.7	4.7	A	0.33	LOS E	Y	-	-
08	6th St. @ Main St.	***Overall Intersection***	14.4	14.4	B	0.70	LOS E	Y	165 220	175 (NBLTR) 225 (SBLTR)
09	6th St. @ Broadway	Eastbound Left/Thru	2.0	2.0	A	0.21	LOS E	Y	-	-
10	6th St. @ C St.	Southbound Thru	5.8	5.8	A	0.84	LOS E	Y	-	-
11	8th St. @ Esther St.	Northbound Left/Thru/Right	14.3	14.3	B	0.35	LOS E	Y	-	-
12	8th St. @ Columbia St.	***Overall Intersection***	30.2	30.2	C	0.75	LOS E	Y	150 75 75	200 (EBL) 125 (WBL) 125 (SBL)
13	8th St. @ Washington St.	***Overall Intersection***	12.8	12.8	B	0.56	LOS E	Y	-	-
14	8th St. @ Main St.	***Overall Intersection***	24.2	24.2	C	0.74	LOS E	Y	75 200 75 215 215	125 (EBL) 200 (EBTR) 125 (WBL) 225 (NBLTR) 225 (SBLTR)
15	8th St. @ Broadway	***Overall Intersection***	23.0	23.0	C	0.64	LOS E	Y	-	-
16	8th St. @ C St.	***Overall Intersection***	12.3	12.3	B	0.70	LOS E	Y	-	-
17	9th St. @ Esther St.	Westbound Left/Thru/Right	5.1	5.1	A	0.06	LOS E	Y	-	-
18	9th St. @ Columbia St.	Eastbound Left/Thru/Right	15.9	15.9	C	0.34	LOS E	Y	-	-
19	9th St. @ Washington St.	***Overall Intersection***	11.2	11.2	B	0.40	LOS E	Y	-	-
20	9th St. @ Main St.	Eastbound Left/Thru/Right	18.0	18.0	C	0.36	LOS E	Y	-	-
21	9th St. @ Broadway	***Overall Intersection***	26.7	26.7	C	0.37	LOS E	Y	-	-
22	Evergreen Blvd. @ Esther St.	Northbound Left/Thru/Right	9.7	9.7	A	0.22	LOS E	Y	-	-
23	Evergreen Blvd. @ Columbia St.	***Overall Intersection***	28.8	28.8	C	0.71	LOS E	Y	100 220 205	125 (EBL) 225 (NBTR) 225 (SBTR)
24	Evergreen Blvd. @ Washington St.	***Overall Intersection***	19.6	19.6	B	0.61	LOS E	Y	225 210	225 (EBTR) 225 (SBLTR)
25	Evergreen Blvd. @ Main St.	***Overall Intersection***	29.3	29.3	C	0.74	LOS E	Y	75 210 75 215	125 (EBL) 300 (EBTR) 125 (WBL) 225 (NBLTR)
26	Evergreen Blvd. @ Broadway	***Overall Intersection***	19.3	19.3	B	0.66	LOS E	Y	100 210 220	150 (EBL) 225 (EBTR) 225 (NBLTR)
27	Evergreen Blvd. @ C St.	***Overall Intersection***	28.2	28.2	C	0.77	LOS E	Y	75 200 150 100 210	150 (EBL) 200 (EBTR) 175 (WBL) 125 (SBL) 225 (SBTR)
28	11th St. @ Esther St.	Northbound Left/Thru/Right	6.2	6.2	A	0.10	LOS E	Y	-	-
29	11th St. @ Columbia St.	Eastbound Left/Thru/Right	12.1	12.1	B	0.38	LOS E	Y	-	-
30	11th St. @ Washington St.	***Overall Intersection***	11.5	11.5	B	0.44	LOS E	Y	-	-
31	11th St. @ Main St.	Eastbound Left/Thru/Right	12.0	12.0	B	0.50	LOS E	Y	-	-
32	11th St. @ Broadway	***Overall Intersection***	11.7	11.7	B	0.47	LOS E	Y	-	-
33	11th St. @ C St.	Eastbound Left/Thru/Right	21.9	21.9	C	0.24	LOS E	Y	-	-
34	Mill Plain Blvd. @ Columbia St.	***Overall Intersection***	128.0	> 100	F	1.10	LOS E	Y**	810 200 150	825 (EBLTR) 200 (NBT) 175 (NBR)
35	Mill Plain Blvd. @ Washington St.	***Overall Intersection***	46.6	46.6	D	0.61	LOS E	Y	235	250 (EBTR)
36	Mill Plain Blvd. @ Main St.	***Overall Intersection***	37.9	37.9	D	0.71	LOS E	Y	205 100 70	225 (EBLTR) 150 (NBR) 150 (SBL)
37	Mill Plain Blvd. @ Broadway	***Overall Intersection***	44.0	44.0	D	0.71	LOS E	Y	210 210	225 (EBLT) 225 (NBTR)
38	Mill Plain Blvd. @ C St.	***Overall Intersection***	81.4	81.4	F	1.35	LOS E	N	200 215 75 195	200 (EBLTR) 225 (NBTR) 100 (SBL) 200 (SBT)
39	Mill Plain Blvd. @ I-5 SB On-/Off-Ramps									
FF	Mill Plain Blvd. @ I-5 SPUI	***Overall Intersection***	63.3	63.3	E	0.99	LOS E	Y	700 700 740 200	800 (EBL) 850 (EBT) 750 (WBT) 275 (WBR)
40	Mill Plain Blvd. @ I-5 NB On-/Off-Ramps									
41	15th St. @ Columbia St.	***Overall Intersection***	12.0	12.0	B	1.10	LOS E	Y	-	-
42	15th St. @ Washington St.	***Overall Intersection***	6.4	6.4	A	0.52	LOS E	Y	60	75 (WBT)
GG	15th St. @ Mill District Park & Ride	Westbound Thru/Right	0.9	0.9	A	0.34	LOS E	Y	-	-
43	15th St. @ Main St.	***Overall Intersection***	9.5	9.5	A	0.71	LOS E	Y	70	75 (NBL)
44	15th St. @ Broadway	***Overall Intersection***	6.5	6.5	A	0.54	LOS E	Y	-	-
45	15th St. @ C St.	***Overall Intersection***	119.0	> 100	F	1.35	LOS E	N	-	-
D	16th St. @ Washington St.	***Overall Intersection***	23.5	23.5	C	0.29	LOS E	Y	65	75 (WBLT)
HH	16th St. @ Mill District Park & Ride	Northbound Right	3.9	3.9	A	0.15	LOS E	Y	-	-
E	16th St. @ Main St.	***Overall Intersection***	11.2	11.2	B	0.61	LOS E	Y	85	100 (EBLTR)
F	17th Street & Washington	***Overall Intersection***	10.4	10.4	B	0.26	LOS E	Y	-	-
G	17th Street & Main	***Overall Intersection***	8.3	8.3	A	0.35	LOS E	Y	-	-
H	17th Street & Broadway	***Overall Intersection***	8.4	8.4	A	0.18	LOS E	Y	-	-
I	17th Street & C Street	***Overall Intersection***	15.0	15.0	B	0.23	LOS E	Y	-	-
J	17th Street & G Street	***Overall Intersection***	4.5	4.5	A	0.13	LOS E	Y	-	-
46	McLoughlin Blvd. @ Columbia St.	***Overall Intersection***	19.0	19.0	B	0.60	LOS E	Y	-	-
K	McLoughlin Blvd. @ Washington St.	***Overall Intersection***	6.5	6.5	A	0.53	LOS E	Y	-	-
47	McLoughlin Blvd. @ Main St.	***Overall Intersection***	14.4	14.4	B	0.87	LOS E	Y	200 50	200 (NBLTR) 100 (SBR)
48	McLoughlin Blvd. @ Broadway	***Overall Intersection***	12.9	12.9	B	0.61	LOS E	Y	75	125 (EBL)
L	McLoughlin Blvd. @ C St.	***Overall Intersection***	8.5	8.5	A	0.45	LOS E	Y	-	-
M	McLoughlin Blvd. @ G St.	Southbound Left/Thru/Right	6.5	6.5	A	-	LOS E	Y	-	-
II	McLoughlin Blvd. @ Clark College Park & Ride	***Overall Intersection***	8.7	8.7	A	0.38	LOS D	Y	-	-
JJ	McLoughlin Blvd. @ Marshall CC East	***Overall Intersection***	8.1	8.1	A	0.32	LOS D	Y	-	-
49	McLoughlin Blvd. @ Fort Vancouver Way	***Overall Intersection***	15.4	15.4	B	0.55	LOS D	Y	-	-

Continued on next page

Exhibit 4-29

Vancouver Intersection Performance Results

PM Peak Hour

2005 Existing Conditions

#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)
50	24th St. @ Columbia St.	Eastbound Left/Thru/Right	5.4	A	-	LOS E	Y	-	-
51	24th St. @ Main St.	Eastbound Left/Right	7.7	A	0.07	LOS E	Y	-	-
52	4th Plain Blvd. @ Columbia St.	***Overall Intersection***	15.8	B	0.50	LOS D	Y	-	-
53	4th Plain Blvd. @ Main St.	***Overall Intersection***	28.3	C	0.66	LOS D	Y	125 200 75 75 75	150 (WBL) 200 (WBTR) 100 (NBL) 125 (NBR) 125 (SBL)
54	4th Plain Blvd. @ Broadway	***Overall Intersection***	24.0	C	0.94	LOS D	Y	125 495	150 (WBL) 500 (WBTR)
55	4th Plain Blvd. @ F St.	***Overall Intersection***	7.1	A	0.57	LOS D	Y	150	150 (EBT)
56	4th Plain Blvd. @ I-5 SB On-/Off-Ramps	***Overall Intersection***	11.3	B	0.54	LOS D	Y	-	-
57	4th Plain Blvd. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	16.0	B	0.63	LOS D	Y	75	150 (WBR)
58	4th Plain Blvd. @ Post Cemetery	Eastbound Left	7.0	A	-	LOS E	Y	-	-
59	4th Plain Blvd. @ St. Johns Blvd.	***Overall Intersection***	16.6	B	0.54	LOS D	Y	-	-
60	28th St. @ Main St.	Eastbound Left/Thru/Right	6.8	A	0.03	LOS E	Y	-	-
61	28th St. @ Broadway	Northbound Thru/Right	1.9	A	-	LOS E	Y	-	-
62	29th St. @ Main St./Broadway	Eastbound Left/Thru/Right	12.5	B	-	LOS E	Y	-	-
63	33rd St. @ Main St.	***Overall Intersection***	18.3	B	0.45	LOS D	Y	50 50	75 (EBL) 75 (WBL)
64	39th St. @ Main St.	***Overall Intersection***	38.3	D	0.71	LOS D	Y	75 490 75 215 75 125	125 (EBL) 500 (EBTR) 100 (WBL) 225 (WBTR) 125 (NBL) 175 (SBL)
65	39th St. @ F St.	Northbound Left/Thru/Right	> 100	F	0.16	LOS E	N	- 50 430	- 75 (WBL) 450 (WBTR)
66	39th St. @ H St.	***Overall Intersection***	8.3	A	0.57	LOS D	Y	135	150 (WBTR)
67	39th St. @ I-5 SB On-/Off-Ramps	Northbound Left	30.0	D	-	LOS E	Y	- 55 125	- 100 (EBR) 175 (NBR)
68	39th St. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	23.1	C	0.76	LOS D	Y	75	125 (NBR)
69	WSDOT/40th St. @ Main St.	***Overall Intersection***	4.9	A	0.33	LOS D	Y	-	-
70	45th St. @ Main St.	***Overall Intersection***	9.1	A	0.44	LOS D	Y	-	-
71	Hazel Dell @ Main St. (West)	***Overall Intersection***	8.5	A	0.45	LOS D	Y	-	-
72	Ross St. @ Main St.	***Overall Intersection***	8.5	A	0.46	LOS D	Y	60 60	75 (WBL) 75 (WBR)
73	Ross St. @ North Rd.	Southbound Thru/Right	5.0	A	0.18	LOS E	Y	-	-

2030 No-Build

#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)
50	24th St. @ Columbia St.	Eastbound Left/Thru/Right	4.2	A	0.01	LOS E	Y	-	-
51	24th St. @ Main St.	Eastbound Left/Right	46.2	E	0.07	LOS E	Y	-	-
52	4th Plain Blvd. @ Columbia St.	***Overall Intersection***	23.8	C	0.68	LOS D	Y	-	-
53	4th Plain Blvd. @ Main St.	***Overall Intersection***	39.5	D	0.78	LOS D	Y	250 495 170 195 75 425 75 75	300 (EBL) 500 (EBTR) 200 (WBL) 200 (WBT) 100 (NBL) 425 (NBT) 125 (NBR) 125 (SBL)
54	4th Plain Blvd. @ Broadway	***Overall Intersection***	22.4	C	0.98	LOS D	Y	195 125	200 (EBTR) 150 (WBL)
55	4th Plain Blvd. @ F St.	***Overall Intersection***	6.6	A	0.54	LOS D	Y	150	150 (EBT)
56	4th Plain Blvd. @ I-5 SB On-/Off-Ramps	***Overall Intersection***	19.8	B	0.82	LOS D	Y	200 555	275 (EBL) 575 (EBT)
57	4th Plain Blvd. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	53.7	D	0.85	LOS D	Y	275 850 75 600	375 (EBL) 850 (EBT) 150 (WBR) 625 (NBR)
58	4th Plain Blvd. @ Post Cemetery	Eastbound Left	9.1	A	0.01	LOS E	Y	-	-
59	4th Plain Blvd. @ St. Johns Blvd.	***Overall Intersection***	30.6	C	0.65	LOS D	Y	170	250 (EBL)
60	28th St. @ Main St.	Eastbound Left/Thru/Right	6.3	A	0.03	LOS E	Y	-	-
61	28th St. @ Broadway	Northbound Thru/Right	2.3	A	0.30	LOS E	Y	-	-
62	29th St. @ Main St./Broadway	Westbound Left/Thru/Right	62.4	F	-	LOS E	N	-	-
63	33rd St. @ Main St.	***Overall Intersection***	48.6	D	0.56	LOS D	Y	50 50	100 (EBL) 100 (WBL)
64	39th St. @ Main St.	***Overall Intersection***	> 100	F	0.96	LOS D	N	75 1270 75 215 75 1570 125 360	125 (EBL) 1275 (EBTR) 125 (WBL) 225 (WBTR) 125 (NBL) 1575 (NBTR) 175 (SBL) 375 (SBT)
65	39th St. @ F St.	Northbound Left/Thru/Right	> 100	F	0.33	LOS E	N	215 50 430 305	225 (EBTR) 75 (WBL) 450 (WBTR) 325 (NBLR)
66	39th St. @ H St.	***Overall Intersection***	64.3	E	0.76	LOS D	N	430 135 310	450 (EBTR) 150 (WBTR) 325 (SBLTR)
67	39th St. @ I-5 SB On-/Off-Ramps	***Overall Intersection***	43.7	D	0.76	LOS D	Y	135 55 710 1660	150 (EBT) 100 (EBR) 725 (WBT) 1150 (NBR)
68	39th St. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	> 100	F	0.91	LOS D	N	300 710 790 75	325 (EBL) 725 (EBT) 800 (NBLT) 100 (NBR)
69	WSDOT/40th St. @ Main St.	***Overall Intersection***	45.3	D	0.53	LOS D	Y	360	375 (NBTR)
70	45th St. @ Main St.	***Overall Intersection***	16.5	B	0.51	LOS D	Y	335 25	350 (NBL) 50 (NBR)
71	Hazel Dell @ Main St. (West)	***Overall Intersection***	20.5	C	0.58	LOS D	Y	-	-
72	Ross St. @ Main St.	***Overall Intersection***	13.0	B	0.63	LOS D	Y	60 60	75 (WBL) 75 (WBR)
73	Ross St. @ North Rd.	Southbound Thru/Right	23.0	C	0.32	LOS E	Y	-	-

2030 LPA with Highway Phasing (Broadway-Washington/17th)

#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)
50	24th St. @ Columbia St.	Eastbound Left/Thru/Right	4.0	A	0.02	LOS E	Y	-	-
51	24th St. @ Main St.	Eastbound Left/Right	9.3	A	0.07	LOS E	Y	-	-
52	4th Plain Blvd. @ Columbia St.	***Overall Intersection***	32.8	C	0.64	LOS D	Y	-	-
53	4th Plain Blvd. @ Main St.	***Overall Intersection***	49.5	D	0.78	LOS D	Y	250 495 170 195 75 75 75	300 (EBL) 500 (EBTR) 225 (WBL) 200 (WBTR) 100 (NBL) 125 (NBR) 125 (SBL)
54	4th Plain Blvd. @ Broadway	***Overall Intersection***	33.9	C	0.73	LOS D	Y	195 195	200 (EBLTR) 200 (SBLTR)
55	4th Plain Blvd. @ F St.	***Overall Intersection***	7.3	A	0.55	LOS D	Y	150	150 (EBT)
56	4th Plain Blvd. @ I-5 SB On-/Off-Ramps	***Overall Intersection***	16.5	B	0.56	LOS D	Y	200	275 (EBL)
57	4th Plain Blvd. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	29.7	C	0.72	LOS D	Y	-	-
58	4th Plain Blvd. @ Post Cemetery	Eastbound Left	21.5	C	0.01	LOS E	Y	-	-
59	4th Plain Blvd. @ St. Johns Blvd.	***Overall Intersection***	40.3	D	0.57	LOS D	Y	175	250 (EBL)
60	28th St. @ Main St.	Eastbound Left/Thru/Right	9.5	A	0.10	LOS E	Y	-	-
61	28th St. @ Broadway	Westbound Left	4.6	A	0.03	LOS E	Y	-	-
62	29th St. @ Main St./Broadway	Westbound Left/Thru/Right	29.7	D	0.00	LOS E	Y	-	-
63	33rd St. @ Main St.	***Overall Intersection***	> 100	F	0.58	LOS D	N	50 770 50 600 1000 75	100 (EBL) 775 (EBTR) 100 (WBL) 600 (WBTR) 1000 (NBT) 100 (SBL)
64	39th St. @ Main St.	***Overall Intersection***	> 100	F	1.06	LOS D	Y**	75 1270 75 215 75 1570 125 360	200 (EBL) 1275 (EBTR) 225 (WBL) 225 (WBTR) 125 (NBL) 1575 (NBTR) 175 (SBL) 375 (SBT)
65	39th St. @ F St.	Westbound Thru/Right	50.4	F	0.60	LOS E	Y*	215 430	225 (EBTR) 450 (WBTR)
66	39th St. @ H St.	***Overall Intersection***	> 100	F	0.80	LOS D	N	430 135 310	450 (EBTR) 150 (WBTR) 325 (SBLTR)
67	39th St. @ I-5 SB On-/Off-Ramps	***Overall Intersection***	65.7	E	0.89	LOS D	N	135 55 730 680	200 (EBT) 125 (EBR) 775 (WBT) 725 (NBR)
68	39th St. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	> 100	F	1.10	LOS D	Y**	300 710 1170 790 75	425 (EBL) 725 (EBT) 1175 (WBTR) 800 (NBLT) 150 (NBR)
69	WSDOT/40th St. @ Main St.	***Overall Intersection***	65.1	E	0.39	LOS D	N	150 1200	200 (SBL) 1200 (SBTR)
70	45th St. @ Main St.	***Overall Intersection***	38.5	D	0.51	LOS D	Y	200 560	225 (EBL) 575 (SBTR)
71	Hazel Dell @ Main St. (West)	***Overall Intersection***	27.7	C	0.63	LOS D	Y	-	-
72	Ross St. @ Main St.	***Overall Intersection***	15.2	B	0.68	LOS D	Y	60 60	100 (WBL) 75 (WBR)
73	Ross St. @ North Rd.	Southbound Thru/Right	42.0	E	0.29	LOS E	Y	-	-

2030 LPA (Broadway-Washington/17th)

#	Intersection	Approach/Movement	Delay (Seconds)	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)
50	24th St. @ Columbia St.	Eastbound Left/Thru/Right	4.0	4.0	A	0.02	LOS E	Y	-	-
51	24th St. @ Main St.	Eastbound Left/Right	9.3	9.3	A	0.07	LOS E	Y	-	-
52	4th Plain Blvd. @ Columbia St.	***Overall Intersection***	32.8	32.8	C	0.64	LOS D	Y	-	-
53	4th Plain Blvd. @ Main St.	***Overall Intersection***	49.5	49.5	D	0.78	LOS D	Y	250 495 170 195 75 75 75	300 (EBL) 500 (EBTR) 225 (WBL) 200 (WBTR) 100 (NBL) 125 (NBR) 125 (SBL)
54	4th Plain Blvd. @ Broadway	***Overall Intersection***	33.9	33.9	C	0.73	LOS D	Y	195 195	200 (EBLTR) 200 (SBLTR)
55	4th Plain Blvd. @ F St.	***Overall Intersection***	7.3	7.3	A	0.55	LOS D	Y	150	150 (EBT)
56	4th Plain Blvd. @ I-5 SB On-/Off-Ramps	***Overall Intersection***	16.5	16.5	B	0.56	LOS D	Y	200	275 (EBL)
57	4th Plain Blvd. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	29.7	29.7	C	0.72	LOS D	Y	-	-
58	4th Plain Blvd. @ Post Cemetery	Eastbound Left	21.5	21.5	C	0.01	LOS E	Y	-	-
59	4th Plain Blvd. @ St. Johns Blvd.	***Overall Intersection***	40.3	40.3	D	0.57	LOS D	Y	175	250 (EBL)
60	28th St. @ Main St.	Eastbound Left/Thru/Right	9.5	9.5	A	0.10	LOS E	Y	-	-
61	28th St. @ Broadway	Westbound Left	4.6	4.6	A	0.03	LOS E	Y	-	-
62	29th St. @ Main St./Broadway	Westbound Left/Thru/Right	29.7	29.7	D	0.00	LOS E	Y	-	-
63	33rd St. @ Main St.	***Overall Intersection***	14.5	14.5	B	0.58	LOS D	Y	50 50	75 (EBL) 75 (WBL)
64	39th St. @ Main St.	***Overall Intersection***	283.4	> 100	F	1.03	LOS D	Y**	75 1270 175 215 75 125	200 (EBL) 1275 (EBTR) 200 (WBL) 225 (WBTR) 125 (NBL) 200 (SBL)
65	39th St. @ F St.	Westbound Thru/Right	50.6	50.6	F	0.59	LOS E	Y*	430	450 (WBTR)
66	39th St. @ H St.	***Overall Intersection***	30.8	30.8	C	0.76	LOS D	Y	435 135	450 (EBTR) 150 (WBTR)
67	39th St. @ I-5 SB On-/Off-Ramps	Westbound Thru	71.0	71.0	F	0.63	LOS E	N	55 730	100 (EBR) 750 (WBT)
68	39th St. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	401.4	> 100	F	0.65	LOS D	Y**	1175 790 75	1175 (WBT) 800 (NBL) 150 (NBR)
69	WSDOT/40th St. @ Main St.	***Overall Intersection***	4.2	4.2	A	0.41	LOS D	Y	-	-
70	45th St. @ Main St.	***Overall Intersection***	11.6	11.6	B	0.51	LOS D	Y	-	-
71	Hazel Dell @ Main St. (West)	***Overall Intersection***	18.8	18.8	B	0.63	LOS D	Y	-	-
72	Ross St. @ Main St.	***Overall Intersection***	15.2	15.2	B	0.68	LOS D	Y	60 60	100 (WBL) 75 (WBR)
73	Ross St. @ North Rd.	Southbound Thru/Right	47.8	47.8	E	0.29	LOS E	Y	-	-

Delay / LOS affected by freeway congestion

Intersection queuing spills back into upstream intersection

Note 1 The ICU is used for overall intersections (signalized and unsignalized). The V/C is used for the identified movement(s) at unsignalized intersections.

Note 2 The 2003 Vancouver Concurrency Administration Manual designates an acceptable LOS standard of LOS E for downtown and LOS D for all other intersections.

Note 3 2030 LPA and LPA Phase I Roundabout intersection operations taken from VISSIM analysis

* Intersection not modeled in existing conditions scenario

Y* Intersection does not meet standard in the Build scenario, but meets the "do no worse" criteria as compared to the No Build.

Y** Intersection operations are no worse than No Build, and no mitigation is required.

Exhibit 4-30

Portland Intersection Performance Results

AM Peak Hour		2005 Existing Conditions								2030 No-Build							
#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2,3,4]	Meets Standard	Storage Length	95% Queue (ft)	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2,3,4]	Meets Standard	Storage Length	95% Queue (ft)
01	Fremont and MLK Jr.	Overall Intersection	24.2	C	0.83	LOS D	Y	125	200 (WBL)	Overall Intersection	87.6	F	0.93	LOS D	N	125	250 (WBL)
02	Going and Interstate	Overall Intersection	31.7	C	0.75	LOS D	Y	125	250 (WBL)	Overall Intersection	52.9	D	0.88	LOS D	Y	125	275 (WBL)
								125	150 (NBL)							125	150 (NBL)
																355	450 (EBL)
03	Alberta and Interstate	Overall Intersection	18.0	B	0.72	LOS D	Y	100	125 (SBL)	Overall Intersection	27.5	C	0.73	LOS D	Y	100	150 (SBL)
04	Alberta and SB I-5 Off-Ramp	Overall Intersection	13.6	B	0.67	0.85	Y	175	175 (WBLT)	Overall Intersection	46.3	D	0.78	0.85	Y	75	125 (WBL)
																175	175 (WBT)
05	Alberta and NB I-5 Off-Ramp	Overall Intersection	10.1	B	0.49	0.85	Y	-	-	Overall Intersection	53.9	D	0.43	0.85	Y	75	100 (EBL)
06	Alberta and MLK Jr.	Overall Intersection	20.3	C	0.78	LOS D	Y	75	125 (WBR)	Overall Intersection	39.8	D	0.89	LOS D	Y	75	125 (WBR)
								100	125 (NBL)							100	150 (NBL)
																100	125 (SBL)
07	Rosa Parks and Interstate	Overall Intersection	18.2	B	0.54	LOS D	Y	-	-	Overall Intersection	20.6	C	0.62	LOS D	Y	100	125 (WBL)
08	Rosa Parks and I-5 SB On-/Off Ramps	Overall Intersection	18.3	B	0.52	0.85	Y	190	225 (WBL)	Overall Intersection	18.8	B	0.53	0.85	Y	125	150 (SWR)
09	Rosa Parks and I-5 NB On-/Off Ramps	Overall Intersection	11.8	B	0.39	0.85	Y	-	-	Overall Intersection	12.6	B	0.44	0.85	Y	-	-
10	Rosa Parks and MLK Jr.	Overall Intersection	17.5	B	0.66	LOS D	Y	-	-	Overall Intersection	14.7	B	0.70	LOS D	Y	100	150 (NBL)
11	Lombard and Interstate	Overall Intersection	27.8	C	0.72	0.99	Y	150	175 (WBL)	Overall Intersection	> 100	F	0.90	0.99	Y	150	325 (WBL)
																225	275 (NBL)
																150	275 (EBL)
																1155	1175 (EBTR)
																555	1100 (WBTR)
12	Lombard and I-5 SB On-Ramps	Eastbound Thru/Right	4.8	A	0.31	0.85	Y	-	-	Westbound Thru	12.9	B	0.42	0.85	Y	-	-
13	Lombard and I-5 NB Off-Ramps	Northbound Right	8.5	A	0.48	0.85	Y	-	-	Northbound Right	16.8	C	0.57	0.85	Y	-	-
14	Lombard and MLK Jr.	Overall Intersection	61.4	E	0.79	0.99	Y	100	125 (EBL)	Overall Intersection	> 100	F	0.88	0.99	Y	100	175 (EBL)
								100	175 (WBL)							100	175 (WBL)
								100	175 (NBL)							100	200 (NBL)
								150	300 (SBL)							150	300 (SBL)
15	Interstate and Argyle	Overall Intersection	22.2	C	0.61	LOS D	Y	75	125 (EBR)	Overall Intersection	26.7	C	0.69	LOS D	Y	75	125 (EBR)
								50	75 (NBL)							50	125 (NBL)
																150	150 (NBT)
16	Columbia Blvd and I-5 Ramps	Overall Intersection	17.6	B	0.62	0.85	Y	150	200 (WBR)	Overall Intersection	14.9	B	0.63	0.85	Y	150	200 (WBR)
17	Columbia Blvd and MLK Jr.	Overall Intersection	32.7	C	0.72	0.99	Y	100	200 (NBL)	Overall Intersection	37.2	D	0.89	0.99	Y	100	200 (NBL)
								225	250 (SBL)							225	250 (SBL)
18	Victory and Expo Road	Overall Intersection	2.2	A	0.22	LOS E	Y	-	-	Overall Intersection	2.9	A	0.22	LOS E	Y	-	-
19	Victory Blvd and I-5 SB On-Ramp	Westbound Left/Thru	1.1	A	0.17	0.85	Y	-	-	Westbound Left/Thru	1.3	A	0.21	0.85	Y	-	-
20	Victory Blvd and NB On-/Off-Ramps	Overall Intersection	4.0	A	0.10	0.85	Y	-	-	Overall Intersection	5.0	A	0.13	0.85	Y	-	-
21	Union Ct and I-5 NB Off-Ramp	Eastbound Left	7.1	A	0.24	0.85	Y	-	-	Eastbound Left	8.4	A	0.28	0.85	Y	-	-
22	Union Ct/Marine Way and Vancouver Way	Overall Intersection	5.8	A	0.36	LOS E	Y	-	-	Overall Intersection	6.4	A	0.46	LOS E	Y	-	-
23	Marine Dr and I-5 On-/Off-Ramps	Overall Intersection	32.8	C	0.66	0.85	Y	200	275 (NBL)	Overall Intersection	> 100	F	0.83	0.85	Y	200	2075 (NBL)
								125	200 (SBR)							275	350 (EBL)
24	Center Ave and I-5 SB On-/Off Ramps	Overall Intersection	11.0	B	0.35	0.85	Y	-	-	Overall Intersection	11.2	B	0.35	0.85	Y	-	-
25	Hayden Island Dr and Hayden Island Dr South	Overall Intersection	8.2	A	0.35	0.85	Y	-	-	Overall Intersection	9.5	A	0.32	0.85	Y	-	-
AA	Vancouver Way and MLK Jr. ramps																
BB	Vancouver Way and new underpass																
CC	Union Ct and new underpass																
DD	Union Ct and MLK ramps																
EE	Connector Road and Marine Drive																
FF	Hayden Island Northbound Off-Ramp																
GG	Hayden Island Southbound On-Ramp																
HH	Hayden Island Northbound On-Ramp																
II	Hayden Island Southbound Off-Ramp																
JJ	Hayden Island Drive and Jantzen Drive																
KK	Tomahawk Island Drive and Jantzen Drive																
LL	Jantzen Ave and Sunrise																
MM	Jantzen Ave and Main Street																
NN	Hayden Island Drive and Main Street																
OO	Hayden Island Drive and Sunrise																
PP	Local Bridge and Little Marine Drive																
QQ	Local Bridge and Tomahawk Is Drive																

AM Peak Hour		2030 LPA Option A with Highway Phasing								2030 LPA Option A							
#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[3,4,5,6]	Meets Standard	Storage Length	95% Queue (ft)	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[3,4,5,6]	Meets Standard	Storage Length	95% Queue (ft)
01	Fremont and MLK Jr.	Overall Intersection	58.7	E	0.92	LOS D	Y*	125	250 (WBL)	Overall Intersection	58.7	E	0.92	LOS D	Y*	125	250 (WBL)
02	Going and Interstate	Overall Intersection	78.4	E	0.88	LOS D	N	355	550 (EBL)	Overall Intersection	78.4	E	0.88	LOS D	N	355	550 (EBL)
								125	300 (WBL)							125	300 (WBL)
								175	300 (NBL)							175	300 (NBL)
03	Alberta and Interstate	Overall Intersection	25.3	C	0.79	LOS D	Y	100	150 (SBL)	Overall Intersection	25.3	C	0.79	LOS D	Y	100	150 (SBL)
04	Alberta and SB I-5 Off-Ramp	Overall Intersection	22.0	C	0.68	0.85	Y	75	125 (WBL)	Overall Intersection	22.0	C	0.68	0.85	Y	75	125 (WBL)
								175	175 (WBT)							175	175 (WBT)
05	Alberta and NB I-5 Off-Ramp	Overall Intersection	34.5	C	0.41	0.85	Y	75	125 (EBL)	Overall Intersection	34.5	C	0.41	0.85	Y	75	125 (EBL)
06	Alberta and MLK Jr.	Overall Intersection	34.6	C	0.87	LOS D	Y	75	150 (WBR)	Overall Intersection	34.6	C	0.87	LOS D	Y	75	150 (WBR)
								100	150 (NBL)							100	150 (NBL)
								100	175 (SBL)							100	175 (SBL)
07	Rosa Parks and Interstate	Overall Intersection	20.1	C	0.65	LOS D	Y	-	-	Overall Intersection	20.1	C	0.65	LOS D	Y	-	-
08	Rosa Parks and I-5 SB On-/Off Ramps	Overall Intersection	17.8	B	0.49	0.85	Y	-	-	Overall Intersection	17.8	B	0.49	0.85	Y	-	-
09	Rosa Parks and I-5 NB On-/Off Ramps	Overall Intersection	13.2	B	0.44	0.85	Y	-	-	Overall Intersection	13.2	B	0.44	0.85	Y	-	-
10	Rosa Parks and MLK Jr.	Overall Intersection	15.1	B	0.71	LOS D	Y	100	125 (NBL)	Overall Intersection	15.1	B	0.71	LOS D	Y	100	125 (NBL)
11	Lombard and Interstate	Overall Intersection	> 100	F	0.77	0.99	Y	150	325 (WBL)	Overall Intersection	> 100	F	0.77	0.99	Y	150	325 (WBL)
								555	625 (WBTR)							555	625 (WBTR)
								225	400 (NBL)							225	400 (NBL)
12	Lombard and I-5 SB On-Ramps	Westbound Thru	4.3	A	0.70	0.85	Y	-	-	Westbound Thru	4.3	A	0.70	0.85	Y	-	-
13	Lombard and I-5 NB Off-Ramps	Northbound Right	7.1	A	0.59	0.85	Y	-	-	Northbound Right	7.1	A	0.59	0.85	Y	-	-
14	Lombard and MLK Jr.	Overall Intersection	> 100	F	0.85	0.99	Y	100	200 (EBL)	Overall Intersection	> 100	F	0.85	0.99	Y	100	200 (EBL)
								100	200 (WBL)							100	200 (WBL)
								100	200 (NBL)							100	200 (NBL)
								150	300 (SBL)							150	300 (SBL)
15	Interstate and Argyle	Overall Intersection	23.0	C	0.69	LOS D	Y	75	125 (EBR)	Overall Intersection	23.0	C	0.69	LOS D	Y	75	125 (EBR)
								50	125 (NBL)							50	125 (NBL)
								150	150 (NBT)							150	150 (NBT)
16	Columbia Blvd and I-5 Ramps	Overall Intersection	13.8	B	0.54	0.85	Y	-	-	Overall Intersection	13.8	B	0.54	0.85	Y	-	-
17	Columbia Blvd and MLK Jr.	Overall Intersection	33.1	C	0.72	0.99	Y	100	225 (NBL)	Overall Intersection	33.1	C	0.72	0.99	Y	100	225 (NBL)
								225	300 (SBL)							225	300 (SBL)
18	Victory and Expo Road	Overall Intersection	2.6	A	0.20	LOS E	Y	-	-	Overall Intersection	2.6	A	0.20	LOS E	Y	-	-
19	Victory Blvd and I-5 SB On-Ramp	Westbound Left/Thru	1.1	A	0.10	0.85	Y	-	-	Westbound Left/Thru	1.1	A	0.10	0.85	Y	-	-
20	Victory Blvd and NB On-/Off-Ramps	Overall Intersection	5.6	A	0.28	0.85	Y	-	-	Overall Intersection	5.6	A	0.28	0.85	Y	-	-
21	Union Ct and I-5 NB Off-Ramp																
22	Union Ct/Marine Way and Vancouver Way																
23	Marine Dr and I-5 On-/Off-Ramps	Overall Intersection	15.8	B	0.47	0.75	Y	-	-	Overall Intersection	10.2	B	0.37	0.75	Y	-	-
24	Center Ave and I-5 SB On-/Off Ramps																
25	Hayden Island Dr and Hayden Island Dr South																
AA	Vancouver Way and MLK Jr. ramps	Overall Intersection	10.7	B	0.61	0.75	Y	-	-	Overall Intersection	12.1	B	0.61	0.75	Y	-	-
BB	Vancouver Way and new underpass	Overall Intersection	14.9	B	0.62	LOS D	Y	-	-	Overall Intersection	14.6	B	0.62	LOS D	Y	-	-
CC	Union Ct and new underpass	Eastbound Left/Right	5.4	A	0.03	LOS E	Y	-	-	Eastbound Left/Right	4.9	A	0.03	LOS E	Y	-	-
DD	Union Ct and MLK ramps	Westbound Right	3.7	A	0.41	0.75	Y	-	-	Westbound Right	3.4	A	0.41	0.75	Y	-	-
EE	Connector Road and Marine Drive	Southbound Left/Right	8.9	A	0.07	LOS E	Y	-	-	Southbound Left/Right	9.7	A	0.07	LOS E	Y	-	-
FF	Hayden Island Northbound Off-Ramp	Overall Intersection	13.4	B	0.32	0.75	Y	-	-	Overall Intersection	12.5	B	0.32	0.75	Y	-	-
GG	Hayden Island Southbound On-Ramp	Overall Intersection	6.4	A	0.27	0.75	Y	-	-	Overall Intersection	5.9	A	0.27	0.75	Y	-	-
HH	Hayden Island Northbound On-Ramp	Overall Intersection	7.2	A	0.28	0.75	Y	-	-	Overall Intersection	14.4	B	0.26	0.75	Y	-	-
II	Hayden Island Southbound Off-Ramp	Overall Intersection	2.6	A	0.35	0.75	Y	-	-	Overall Intersection	4.3	A	0.35	0.75	Y	-	-
JJ	Hayden Island Drive and Jantzen Drive	Overall Intersection	11.2	B	0.35	0.85	Y	-	-	Overall Intersection	10.8	B	0.34	0.85	Y	-	-
KK	Tomahawk Island Drive and Jantzen Drive	Overall Intersection	16.5	B	0.57	0.85	Y	-	-	Overall Intersection	16.3	B	0.57	0.85	Y	-	-
LL	Jantzen Ave and Sunrise	Southbound Left/Right	6.4	A	0.02	0.85	Y	-	-	Southbound Left/Right	7.3	A	0.02	0.85	Y	-	-
MM	Jantzen Ave and Main Street	Overall Intersection	12.0	B	0.43	0.85	Y	-	-	Overall Intersection	6.7	A	0.40	0.85	Y	-	-
NN	Hayden Island Drive and Main Street	Overall Intersection	7.8	A	0.38	0.85	Y	-	-	Overall Intersection	7.5	A	0.38	0.85	Y	-	-
OO	Hayden Island Drive and Sunrise	Northbound Right	3.8	A	0.08	0.85	Y	-	-	Northbound Right	4.0	A	0.08	0.85	Y	-	-
PP	Local Bridge and Little Marine Drive	Overall Intersection	4.4	A	0.32	LOS D	Y	-	-	Overall Intersection	4.4	A	0.32	LOS D	Y	-	-
QQ	Local Bridge and Tomahawk Is Drive	Overall Intersection	3.4	A	0.21	LOS D	Y	-	-	Overall Intersection	2.0	A	0.21	LOS D	Y	-	-

AM Peak Hour		2030 LPA Option B with Highway Phasing								2030 LPA Option B							
#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[3,4,5,6]	Meets Standard	Storage Length	95% Queue (ft)	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[3,4,5,6]	Meets Standard	Storage Length	95% Queue (ft)
01	Fremont and MLK Jr.	Overall Intersection	58.7	E	0.92	LOS D	Y*	125	250 (WBL)	Overall Intersection	58.7	E	0.92	LOS D	Y*	125	250 (WBL)
02	Going and Interstate	Overall Intersection	78.4	E	0.88	LOS D	N	355	550 (EBL)	Overall Intersection	78.4	E	0.88	LOS D	N	355	550 (EBL)
								125	300 (WBL)							125	300 (WBL)
								175	300 (NBL)							175	300 (NBL)
03	Alberta and Interstate	Overall Intersection	25.3	C	0.79	LOS D	Y	100	150 (SBL)	Overall Intersection	25.3	C	0.79	LOS D	Y	100	150 (SBL)
04	Alberta and SB I-5 Off-Ramp	Overall Intersection	22.0	C	0.68	0.85	Y	75	125 (WBL)	Overall Intersection	22.0	C	0.68	0.85	Y	75	125 (WBL)
								175	175 (WBT)							175	175 (WBT)
05	Alberta and NB I-5 Off-Ramp	Overall Intersection	34.5	C	0.41	0.85	Y	75	125 (EBL)	Overall Intersection	34.5	C	0.41	0.85	Y	75	125 (EBL)
06	Alberta and MLK Jr.	Overall Intersection	34.6	C	0.87	LOS D	Y	75	150 (WBR)	Overall Intersection	34.6	C	0.87	LOS D	Y	75	150 (WBR)
								100	150 (NBL)							100	150 (NBL)
								100	175 (SBL)							100	175 (SBL)
07	Rosa Parks and Interstate	Overall Intersection	20.1	C	0.65	LOS D	Y	-	-	Overall Intersection	20.1	C	0.65	LOS D	Y	-	-
08	Rosa Parks and I-5 SB On-/Off Ramps	Overall Intersection	17.8	B	0.49	0.85	Y	-	-	Overall Intersection	17.8	B	0.49	0.85	Y	-	-
09	Rosa Parks and I-5 NB On-/Off Ramps	Overall Intersection	13.2	B	0.44	0.85	Y	-	-	Overall Intersection	13.2	B	0.44	0.85	Y	-	-
10	Rosa Parks and MLK Jr.	Overall Intersection	15.1	B	0.71	LOS D	Y	100	125 (NBL)	Overall Intersection	15.1	B	0.71	LOS D	Y	100	125 (NBL)
11	Lombard and Interstate	Overall Intersection	> 100	F	0.77	0.99	Y	150	325 (WBL)	Overall Intersection	> 100	F	0.77	0.99	Y	150	325 (WBL)
								555	625 (WBTR)							555	625 (WBTR)
								225	400 (NBL)							225	400 (NBL)
12	Lombard and I-5 SB On-Ramps	Westbound Thru	4.3	A	0.70	0.85	Y	-	-	Westbound Thru	4.3	A	0.70	0.85	Y	-	-
13	Lombard and I-5 NB Off-Ramps	Northbound Right	7.1	A	0.59	0.85	Y	-	-	Northbound Right	7.1	A	0.59	0.85	Y	-	-
14	Lombard and MLK Jr.	Overall Intersection	> 100	F	0.85	0.99	Y	100	200 (EBL)	Overall Intersection	> 100	F	0.85	0.99	Y	100	200 (EBL)
								100	200 (WBL)							100	200 (WBL)
								100	200 (NBL)							100	200 (NBL)
								150	300 (SBL)							150	300 (SBL)
15	Interstate and Argyle	Overall Intersection	23.0	C	0.69	LOS D	Y	75	125 (EBR)	Overall Intersection	23.0	C	0.69	LOS D	Y	75	125 (EBR)
								50	125 (NBL)							50	125 (NBL)
								150	150 (NBT)							150	150 (NBT)
16	Columbia Blvd and I-5 Ramps	Overall Intersection	13.8	B	0.54	0.85	Y	-	-	Overall Intersection	13.8	B	0.54	0.85	Y	-	-
17	Columbia Blvd and MLK Jr.	Overall Intersection	33.1	C	0.72	0.99	Y	100	225 (NBL)	Overall Intersection	33.1	C	0.72	0.99	Y	100	225 (NBL)
								225	300 (SBL)							225	300 (SBL)
18	Victory and Expo Road	Overall Intersection	2.6	A	0.20	LOS E	Y	-	-	Overall Intersection	2.6	A	0.20	LOS E	Y	-	-
19	Victory Blvd and I-5 SB On-Ramp	Westbound Left/Thru	1.1	A	0.10	0.85	Y	-	-	Westbound Left/Thru	1.1	A	0.10	0.85	Y	-	-
20	Victory Blvd and NB On-/Off-Ramps	Overall Intersection	5.6	A	0.28	0.85	Y	-	-	Overall Intersection	5.6	A	0.28	0.85	Y	-	-
21	Union Ct and I-5 NB Off-Ramp																
22	Union Ct/Marine Way and Vancouver Way																
23	Marine Dr and I-5 On-/Off-Ramps	Overall Intersection	15.2	B	0.50	0.75	Y	-	-	Overall Intersection	11.1	B	0.39	0.75	Y	-	-
24	Center Ave and I-5 SB On-/Off Ramps																
25	Hayden Island Dr and Hayden Island Dr South																
AA	Vancouver Way and MLK Jr. ramps	Overall Intersection	14.1	B	0.62	0.75	Y	-	-	Overall Intersection	12.9	B	0.62	0.75	Y	-	-
BB	Vancouver Way and new underpass	Overall Intersection	16.7	B	0.60	LOS D	Y	-	-	Overall Intersection	16.6	B	0.60	LOS D	Y	-	-
CC	Union Ct and new underpass	Northbound Thru	4.2	A	0.31	LOS E	Y	-	-	Northbound Thru	4.3	A	0.31	LOS E	Y	-	-
DD	Union Ct and MLK ramps	Westbound Right	4.0	A	0.44	0.75	Y	-	-	Westbound Right	4.2	A	0.44	0.75	Y	-	-
EE	Connector Road and Marine Drive	Overall Intersection	11.0	B	0.56	LOS D	Y	-	-	Overall Intersection	12.1	B	0.56	LOS D	Y	-	-
FF	Hayden Island Northbound Off-Ramp	Overall Intersection	15.7	B	0.45	0.75	Y	-	-	Overall Intersection	15.7	B	0.45	0.75	Y	-	-
GG	Hayden Island Southbound On-Ramp	Overall Intersection	3.9	A	0.35	0.75	Y	-	-	Overall Intersection	3.9	A	0.35	0.75	Y	-	-
HH	Hayden Island Northbound On-Ramp	Overall Intersection	13.7	B	0.37	0.75	Y	-	-	Overall Intersection	13.7	B	0.37	0.75	Y	-	-
II	Hayden Island Southbound Off-Ramp	Overall Intersection	4.2	A	0.37	0.75	Y	-	-	Overall Intersection	4.2	A	0.37	0.75	Y	-	-
JJ	Hayden Island Drive and Jantzen Drive	Overall Intersection	10.7	B	0.35	0.85	Y	-	-	Overall Intersection	10.7	B	0.35	0.85	Y	-	-
KK	Tomahawk Island Drive and Jantzen Drive	Overall Intersection	15.8	B	0.57	0.85	Y	-	-	Overall Intersection	15.8	B	0.57	0.85	Y	-	-
LL	Jantzen Ave and Sunrise	Southbound Left/Right	3.5	A	0.01	0.85	Y	-	-	Southbound Left/Right	3.5	A	0.01	0.85	Y	-	-
MM	Jantzen Ave and Main Street	Overall Intersection	6.6	A	0.41	0.85	Y	-	-	Overall Intersection	6.6	A	0.41	0.85	Y	-	-
NN	Hayden Island Drive and Main Street	Overall Intersection	8.3	A	0.41	0.85	Y	-	-	Overall Intersection	8.3	A	0.41	0.85	Y	-	-
OO	Hayden Island Drive and Sunrise	Northbound Right	4.8	A	0.12	0.85	Y	-	-	Northbound Right	4.8	A	0.12	0.85	Y	-	-
PP	Local Bridge and Little Marine Drive																
QQ	Local Bridge and Tomahawk Is Drive																

Delay / LOS affected by freeway congestion

Intersection queuing spills back into upstream intersection

Note 1 The ICU is used for signalized and AWSC intersections. The V/C is used for the critical movement at other intersections.

Note 2 The ODOT V/C standard of 0.85 is used for ramp terminals in the Existing and No-Build scenarios (Action 1F1)

Note 3 The ODOT V/C standard of 0.99 is used for ODOT-controlled intersections along Lombard Street (US-30) and MLK Jr. Boulevard (OR-99W), that are not ramp terminals, for the Existing, No-Build and LPA scenarios as stated in the OHP (Table 7, 2004 update).

Note 4 The PBOT operational standard for signalized intersections is LOS D and, for unsignalized intersections, is LOS E.

Note 5 The ODOT V/C standard of 0.85 is used for ramp terminals in the LPA scenarios that remain unchanged from the No-Build scenario, as stated in the Oregon Highway Plan (Action 1F1). New or reconstructed ramp terminals in the LPA scenarios have a V/C standard of 0.75 as stated in the Oregon Highway Design Manual (Table 10-1)

Note 6 The ODOT V/C standard of 0.85 is used for ODOT-controlled intersections along regional highways or district/local roads in the Build scenarios as stated in the Oregon Highway Design Manual (Table 10-1)

Y* Intersection does not meet the stated standard in the LPA scenarios, but meets the PBOT "do no worse" practice as compared to the No-Build.

Exhibit 4-31

Portland Intersection Performance Results

PM Peak Hour

2005 Existing Conditions

#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2,3,4]	Meets Standard	Storage Length	95% Queue (ft)
01	Fremont and MLK Jr.	***Overall Intersection***	30.5	C	0.89	LOS D	Y	125	150 (EBL)
								125	175 (NBL)
								125	150 (SBL)
02	Going and Interstate	***Overall Intersection***	33.8	C	0.72	LOS D	Y	125	150 (NBL)
03	Alberta and Interstate	***Overall Intersection***	25.1	C	0.76	LOS D	Y	125	175 (NBL)
04	Alberta and SB I-5 Off-Ramp	***Overall Intersection***	10.4	B	0.63	0.85	Y	-	-
05	Alberta and NB I-5 Off-Ramp	***Overall Intersection***	10.1	B	0.70	0.85	Y	-	-
06	Alberta and MLK Jr.	***Overall Intersection***	38.0	D	0.88	LOS D	Y	75	150 (WBR)
								100	150 (NBL)
								100	150 (SBL)
07	Rosa Parks and Interstate	***Overall Intersection***	32.0	C	0.71	LOS D	Y	100	150 (WBL)
								175	225 (NBL)
08	Rosa Parks and I-5 SB On-/Off Ramps	***Overall Intersection***	15.0	B	0.48	0.85	Y	-	-
09	Rosa Parks and I-5 NB On-/Off Ramps	***Overall Intersection***	12.7	B	0.42	0.85	Y	-	-
10	Rosa Parks and MLK Jr.	***Overall Intersection***	16.5	B	0.75	LOS D	Y	100	150 (NBL)
11	Lombard and Interstate	***Overall Intersection***	32.4	C	0.76	0.99	Y	100	175 (NBR)
12	Lombard and I-5 SB On-Ramps	Eastbound Thru/Right	3.7	A	0.36	0.85	Y	-	-
13	Lombard and I-5 NB Off-Ramps	Northbound Right	10.7	B	0.42	0.85	Y	-	-
14	Lombard and MLK Jr.	***Overall Intersection***	74.0	E	0.85	0.99	Y	100	150 (EBL)
								100	175 (WBL)
								100	225 (NBL)
								150	300 (SBL)
15	Interstate and Argyle	***Overall Intersection***	17.6	B	0.61	LOS D	Y	75	125 (EBR)
								50	75 (NBL)
16	Columbia Blvd and I-5 Ramps	***Overall Intersection***	12.6	B	0.58	0.85	Y	150	175 (WBR)
17	Columbia Blvd and MLK Jr.	***Overall Intersection***	39.3	D	0.71	0.99	Y	150	175 (WBL)
								100	225 (NBL)
								225	300 (SBL)
18	Victory and Expo Road	***Overall Intersection***	4.4	A	0.32	LOS E	Y	-	-
19	Victory Blvd and I-5 SB On-Ramp	Eastbound Thru	5.5	A	0.27	0.85	Y	-	-
20	Victory Blvd and NB On-/Off-Ramps	***Overall Intersection***	56.9	E	0.32	0.85	Y	290	325 (EBL)
								200	250 (WBTR)
21	Union Ct and I-5 NB Off-Ramp	Eastbound Left/Thru	33.1	D	0.30	0.85	Y	200	250 (EBL)
22	Union Ct/Marine Way and Vancouver Way	***Overall Intersection***	28.3	D	0.66	LOS E	Y	75	100 (SBLTR)
								370	500 (NBLT)
								370	400 (NBR)
								55	75 (SWL)
								55	75 (SWTR)
23	Marine Dr and I-5 On-/Off-Ramps	***Overall Intersection***	55.7	E	0.69	0.85	Y	275	325 (EBL)
								375	1150 (WBR)
24	Center Ave and I-5 SB On-/Off Ramps	***Overall Intersection***	20.2	C	0.61	0.85	Y	115	225 (WBLT)
25	Hayden Island Dr and Hayden Island Dr South	***Overall Intersection***	12.9	B	0.44	0.85	Y	-	-
AA	Vancouver Way and MLK Jr. ramps								
BB	Vancouver Way and new underpass								
CC	Union Ct and new underpass								
DD	Union Ct and MLK ramps								
EE	Connector Road and Marine Drive								
FF	Hayden Island Northbound Off-Ramp								
GG	Hayden Island Southbound On-Ramp								
HH	Hayden Island Northbound On-Ramp								
II	Hayden Island Southbound Off-Ramp								
JJ	Hayden Island Drive and Jantzen Drive								
KK	Tomahawk Island Drive and Jantzen Drive								
LL	Jantzen Ave and Sunrise								
MM	Jantzen Ave and Main Street								
NN	Hayden Island Drive and Main Street								
OO	Hayden Island Drive and Sunrise								
PP	Local Bridge and Little Marine Drive								
QQ	Local Bridge and Tomahawk Is Drive								

2030 No-Build

#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2,3,4]	Meets Standard	Storage Length	95% Queue (ft)
01	Fremont and MLK Jr.	***Overall Intersection***	93.6	F	0.99	LOS D	N	125	175 (EBL)
								125	150 (NBL)
								125	200 (SBL)
								125	175 (WBL)
02	Going and Interstate	***Overall Intersection***	65.2	E	0.84	LOS D	N	125	225 (NBL)
								125	250 (WBL)
03	Alberta and Interstate	***Overall Intersection***	38.8	D	0.94	LOS D	Y	125	225 (NBL)
								100	150 (SBL)
								965	1150 (NBTR)
04	Alberta and SB I-5 Off-Ramp	***Overall Intersection***	19.5	B	0.52	0.85	Y	75	125 (WBL)
								175	175 (WBT)
05	Alberta and NB I-5 Off-Ramp	***Overall Intersection***	17.3	B	0.74	0.85	Y	75	125 (EBL)
								175	175 (EBT)
06	Alberta and MLK Jr.	***Overall Intersection***	71.9	E	0.91	LOS D	N	100	200 (NBL)
								100	200 (SBL)
07	Rosa Parks and Interstate	***Overall Intersection***	36.3	D	0.75	LOS D	Y	100	200 (WBL)
								175	225 (NBL)
08	Rosa Parks and I-5 SB On-/Off Ramps	***Overall Intersection***	17.2	B	0.52	0.85	Y	125	175 (SWR)
09	Rosa Parks and I-5 NB On-/Off Ramps	***Overall Intersection***	9.3	A	0.40	0.85	Y	-	-
10	Rosa Parks and MLK Jr.	***Overall Intersection***	16.8	B	0.84	LOS D	Y	100	150 (NBL)
11	Lombard and Interstate	***Overall Intersection***	> 100	F	0.95	0.99	Y	100	200 (NBR)
								250	275 (SBL)
								150	250 (EBL)
								150	300 (WBL)
								225	300 (NBL)
								1150	1150 (EBTR)
12	Lombard and I-5 SB On-Ramps	Westbound Thru	7.6	A	0.56	0.85	Y	-	-
13	Lombard and I-5 NB Off-Ramps	Northbound Right	14.9	B	0.55	0.85	Y	-	-
14	Lombard and MLK Jr.	***Overall Intersection***	> 100	F	0.99	0.99	Y	100	200 (EBL)
								100	200 (WBL)
								100	225 (NBL)
								150	250 (SBL)
								1320	1325 (SBTR)
								1730	1750 (EBTR)
15	Interstate and Argyle	***Overall Intersection***	> 100	F	0.63	LOS D	N	1300	1300 (EBLT)
								50	125 (NBL)
								125	125 (NBT)
								75	150 (EBR)
16	Columbia Blvd and I-5 Ramps	***Overall Intersection***	11.7	B	0.57	0.85	Y	-	-
17	Columbia Blvd and MLK Jr.	***Overall Intersection***	83.5	F	0.74	0.99	Y	350	450 (WBL)
								100	225 (NBL)
								225	400 (SBL)
								150	450 (EBR)
18	Victory and Expo Road	***Overall Intersection***	45.6	E	0.39	LOS E	Y	-	-
19	Victory Blvd and I-5 SB On-Ramp	Eastbound Thru	27.7	D	0.28	0.85	Y	75	75 (EBT)
20	Victory Blvd and NB On-/Off-Ramps	***Overall Intersection***	> 100	F	0.31	0.85	Y	290	775 (EBL)
								850	850 (WBT)
								200	225 (WBR)
21	Union Ct and I-5 NB Off-Ramp	Northbound Thru	> 100	F	0.20	0.85	Y	200	300 (EBL)
								1195	1550 (EBR)
22	Union Ct/Marine Way and Vancouver Way	***Overall Intersection***	> 100	F	0.61	LOS E	N	75	200 (SBLTR)
								370	2500 (NBLT)
								370	2500 (NBTR)
								55	100 (SWL)
								55	150 (SWTR)
23	Marine Dr and I-5 On-/Off-Ramps	***Overall Intersection***	> 100	F	0.82	0.85	Y	275	400 (EBL)
								2130	2150 (EBT)
								375	2925 (WBR)
								200	1525 (NBLT)
24	Center Ave and I-5 SB On-/Off Ramps	***Overall Intersection***	24.8	C	0.80	0.85	Y	115	225 (WBLT)
								75	125 (WBR)
25	Hayden Island Dr and Hayden Island Dr South	***Overall Intersection***	69.8	E	0.67	0.85	Y	70	100 (WBLR)
								150	200 (SBL)
								820	825 (SBT)
AA	Vancouver Way and MLK Jr. ramps								
BB	Vancouver Way and new underpass								
CC	Union Ct and new underpass								
DD	Union Ct and MLK ramps								
EE	Connector Road and Marine Drive								
FF	Hayden Island Northbound Off-Ramp								
GG	Hayden Island Southbound On-Ramp								
HH	Hayden Island Northbound On-Ramp								
II	Hayden Island Southbound Off-Ramp								
JJ	Hayden Island Drive and Jantzen Drive								
KK	Tomahawk Island Drive and Jantzen Drive								
LL	Jantzen Ave and Sunrise								
MM	Jantzen Ave and Main Street								
NN	Hayden Island Drive and Main Street								
OO	Hayden Island Drive and Sunrise								
PP	Local Bridge and Little Marine Drive								
QQ	Local Bridge and Tomahawk Is Drive								

2030 LPA Option A with Highway Phasing

#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[3,4,5,6]	Meets Standard	Storage Length	95% Queue (ft)
01	Fremont and MLK Jr.	***Overall Intersection***	61.9	E	0.98	LOS D	Y*	125	150 (EBL)
								125	175 (WBL)
								125	150 (NBL)
								125	225 (SBL)
02	Going and Interstate	***Overall Intersection***	43.2	D	0.83	LOS D	Y	355	425 (EBL)
								125	200 (WBL)
								175	200 (NBL)
03	Alberta and Interstate	***Overall Intersection***	42.9	D	0.90	LOS D	Y	125	200 (NBL)
								100	150 (SBL)
04	Alberta and SB I-5 Off-Ramp	***Overall Intersection***	18.5	B	0.56	0.85	Y	75	125 (WBL)
								175	175 (WBT)
05	Alberta and NB I-5 Off-Ramp	***Overall Intersection***	20.0	B	0.75	0.85	Y	75	125 (EBL)
								175	175 (EBT)
06	Alberta and MLK Jr.	***Overall Intersection***	45.6	D	0.88	LOS D	Y	100	175 (NBL)
								100	175 (SBL)
07	Rosa Parks and Interstate	***Overall Intersection***	45.4	D	0.77	LOS D	Y	100	125 (EBL)
								100	175 (WBL)
								175	300 (NBL)
08	Rosa Parks and I-5 SB On-/Off Ramps	***Overall Intersection***	15.5	B	0.54	0.85	Y	125	150 (SWR)
09	Rosa Parks and I-5 NB On-/Off Ramps	***Overall Intersection***	15.7	B	0.59	0.85	Y	190	225 (EBL)
10	Rosa Parks and MLK Jr.	***Overall Intersection***	19.5	B	0.82	LOS D	Y	100	150 (NBL)
11	Lombard and Interstate	***Overall Intersection***	> 100	F	0.92	0.99	Y	150	250 (EBL)
								1150	1150 (EBTR)
								150	275 (WBL)
								350	425 (NBL)
								100	175 (NBR)
								325	450 (SBL)
12	Lombard and I-5 SB On-Ramps	Eastbound Thru/Right	4.8	A	0.54	0.85	Y	-	-
13	Lombard and I-5 NB Off-Ramps	***Overall Intersection***	4.6	A	0.53	0.85	Y	-	-
14	Lombard and MLK Jr.	***Overall Intersection***	> 100	F	0.90	0.99	Y	100	175 (EBL)
								1750	1750 (EBTR)
								100	200 (WBL)
								100	200 (NBL)
								150	300 (SBL)
15	Interstate and Argyle	***Overall Intersection***	19.5	B	0.66	LOS D	Y	75	150 (EBR)
								50	75 (NBL)
								125	125 (NBT)
16	Columbia Blvd and I-5 Ramps	***Overall Intersection***	14.4	B	0.51	0.85	Y	-	-
17	Columbia Blvd and MLK Jr.	***Overall Intersection***	46.3	D	0.77	0.99	Y	350	425 (WBL)
								100	225 (NBL)
								225	400 (SBL)
18	Victory and Expo Road	***Overall Intersection***	5.4	A	0.41	LOS E	Y	-	-
19	Victory Blvd and I-5 SB On-Ramp	Westbound Left/Thru	2.0	A	0.18	0.85	Y	-	-
20	Victory Blvd and NB On-/Off-Ramps	***Overall Intersection***	13.5	B	0.50	0.85	Y	-	-
21	Union Ct and I-5 NB Off-Ramp								
22	Union Ct/Marine Way and Vancouver Way								
23	Marine Dr and I-5 On-/Off-Ramps	***Overall Intersection***	22.1	C	0.64	0.75	Y	-	-
24	Center Ave and I-5 SB On-/Off Ramps								
25	Hayden Island Dr and Hayden Island Dr South								
AA	Vancouver Way and MLK Jr. ramps	***Overall Intersection***	21.3	C	0.66	0.75	Y	-	-
BB	Vancouver Way and new underpass	***Overall Intersection***	23.9	C	0.64	LOS D	Y	-	-
CC	Union Ct and new underpass	Eastbound Left/Right	9.0	A	0.06	LOS E	Y	-	-
DD	Union Ct and MLK ramps	Westbound Right	5.8	A	0.60	0.75	Y	-	-
EE	Connector Road and Marine Drive	Southbound Left/Right	12.4	B	0.07	LOS E	Y	-	-
FF	Hayden Island Northbound Off-Ramp	***Overall Intersection***	13.3	B	0.31	0.75	Y	-	-
GG	Hayden Island Southbound On-Ramp	***Overall Intersection***	6.4	A	0.39	0.75	Y	-	-
HH	Hayden Island Northbound On-Ramp	***Overall Intersection***	11.3	B	0.52	0.75	Y	-	-
II	Hayden Island Southbound Off-Ramp	***Overall Intersection***	6.8	A	0.54	0.75	Y	-	-
JJ	Hayden Island Drive and Jantzen Drive	***Overall Intersection***	12.5	B	0.51	0.85	Y	-	-
KK	Tomahawk Island Drive and Jantzen Drive	***Overall Intersection***	20.1	C	0.63	0.85	Y	-	-
LL	Jantzen Ave and Sunrise	Southbound Left/Right	5.3	A	0.06	0.85	Y	-	-
MM	Jantzen Ave and Main Street	***Overall Intersection***	11.6	B	0.56	0.85	Y	-	-
NN	Hayden Island Drive and Main Street	***Overall Intersection***	21.7	C	0.57	0.85	Y	-	-
OO	Hayden Island Drive and Sunrise	Northbound Right	5.4	A	0.23	0.85	Y	-	-
PP	Local Bridge and Little Marine Drive	***Overall Intersection***	5.4	A	0.44	LOS D	Y	-	-
QQ	Local Bridge and Tomahawk Is Drive	***Overall Intersection***	6.2	A	0.34	LOS D	Y	-	-

2030 LPA Option A

#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[3,4,5,6]	Meets Standard	Storage Length	95% Queue (ft)
01	Fremont and MLK Jr.	***Overall Intersection***	61.9	E	0.98	LOS D	Y*	125	150 (EBL)
								125	175 (WBL)
								125	150 (NBL)
								125	225 (SBL)
02	Going and Interstate	***Overall Intersection***	43.2	D	0.83	LOS D	Y	355	425 (EBL)
								125	200 (WBL)
								175	200 (NBL)
03	Alberta and Interstate	***Overall Intersection***	42.9	D	0.90	LOS D	Y	125	200 (NBL)
								100	150 (SBL)
04	Alberta and SB I-5 Off-Ramp	***Overall Intersection***	18.5	B	0.56	0.85	Y	75	125 (WBL)
								175	175 (WBT)
05	Alberta and NB I-5 Off-Ramp	***Overall Intersection***	20.0	B	0.75	0.85	Y	75	125 (EBL)
								175	175 (EBT)
06	Alberta and MLK Jr.	***Overall Intersection***	45.6	D	0.88	LOS D	Y	100	175 (NBL)
								100	175 (SBL)
07	Rosa Parks and Interstate	***Overall Intersection***	45.4	D	0.77	LOS D	Y	100	125 (EBL)
								100	175 (WBL)
								175	300 (NBL)
08	Rosa Parks and I-5 SB On-/Off Ramps	***Overall Intersection***	15.5	B	0.54	0.85	Y	125	150 (SWR)
09	Rosa Parks and I-5 NB On-/Off Ramps	***Overall Intersection***	15.7	B	0.59	0.85	Y	190	225 (EBL)
10	Rosa Parks and MLK Jr.	***Overall Intersection***	19.5	B	0.82	LOS D	Y	100	150 (NBL)
11	Lombard and Interstate	***Overall Intersection***	> 100	F	0.92	0.99	Y	150	250 (EBL)
								1150	1150 (EBTR)
								150	275 (WBL)
								350	425 (NBL)
								100	175 (NBR)
								325	450 (SBL)
12	Lombard and I-5 SB On-Ramps	Eastbound Thru/Right	4.8	A	0.54	0.85	Y	-	-
13	Lombard and I-5 NB Off-Ramps	***Overall Intersection***	4.6	A	0.53	0.85	Y	-	-
14	Lombard and MLK Jr.	***Overall Intersection***	> 100	F	0.90	0.99	Y	100	175 (EBL)
								1750	1750 (EBTR)
								100	200 (WBL)
								100	200 (NBL)
								150	300 (SBL)
15	Interstate and Argyle	***Overall Intersection***	19.5	B	0.66	LOS D	Y	75	150 (EBR)
								50	75 (NBL)
								125	125 (NBT)
16	Columbia Blvd and I-5 Ramps	***Overall Intersection***	14.4	B	0.51	0.85	Y	-	-
17	Columbia Blvd and MLK Jr.	***Overall Intersection***	46.3	D	0.77	0.99	Y	350	425 (WBL)
								100	225 (NBL)
								225	400 (SBL)
18	Victory and Expo Road	***Overall Intersection***	5.4	A	0.41	LOS E	Y	-	-
19	Victory Blvd and I-5 SB On-Ramp	Westbound Left/Thru	2.0	A	0.18	0.85	Y	-	-
20	Victory Blvd and NB On-/Off-Ramps	***Overall Intersection***	13.5	B	0.50	0.85	Y	-	-
21	Union Ct and I-5 NB Off-Ramp								
22	Union Ct/Marine Way and Vancouver Way								
23	Marine Dr and I-5 On-/Off-Ramps	***Overall Intersection***	11.6	B	0.42	0.75	Y	-	-
24	Center Ave and I-5 SB On-/Off Ramps								
25	Hayden Island Dr and Hayden Island Dr South								
AA	Vancouver Way and MLK Jr. ramps	***Overall Intersection***	19.8	B	0.66	0.75	Y	-	-
BB	Vancouver Way and new underpass	***Overall Intersection***	23.2	C	0.64	LOS D	Y	-	-
CC	Union Ct and new underpass	Eastbound Left/Right	11.8	B	0.06	LOS E	Y	-	-
DD	Union Ct and MLK ramps	Westbound Right	5.9	A	0.60	0.75	Y	-	-
EE	Connector Road and Marine Drive	Southbound Left/Right	17.7	B	0.07	LOS E	Y	-	-
FF	Hayden Island Northbound Off-Ramp	***Overall Intersection***	12.8	B	0.31	0.75	Y	-	-
GG	Hayden Island Southbound On-Ramp	***Overall Intersection***	5.8	A	0.39	0.75	Y	-	-
HH	Hayden Island Northbound On-Ramp	***Overall Intersection***	11.6	B	0.52	0.75	Y	-	-
II	Hayden Island Southbound Off-Ramp	***Overall Intersection***	6.4	A	0.54	0.75	Y	-	-
JJ	Hayden Island Drive and Jantzen Drive	***Overall Intersection***	12.0	B	0.51	0.85	Y	-	-
KK	Tomahawk Island Drive and Jantzen Drive	***Overall Intersection***	19.9	B	0.63	0.85	Y	-	-
LL	Jantzen Ave and Sunrise	Southbound Left/Right	7.1	A	0.06	0.85	Y	-	-
MM	Jantzen Ave and Main Street	***Overall Intersection***	11.1	B	0.56	0.85	Y	-	-
NN	Hayden Island Drive and Main Street	***Overall Intersection***	22.0	C	0.57	0.85	Y	-	-
OO	Hayden Island Drive and Sunrise	Northbound Right	5.6	A	0.23	0.85	Y	-	-
PP	Local Bridge and Little Marine Drive	***Overall Intersection***	5.6	A	0.44	LOS D	Y	-	-
QQ	Local Bridge and Tomahawk Is Drive	***Overall Intersection***	6.0	A	0.34	LOS D	Y	-	-

2030 LPA Option B with Highway Phasing

#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[3,4,5,6]	Meets Standard	Storage Length	95% Queue (ft)
01	Fremont and MLK Jr.	***Overall Intersection***	61.9	E	0.98	LOS D	Y*	125	150 (EBL)
								125	175 (WBL)
								125	150 (NBL)
								125	225 (SBL)
02	Going and Interstate	***Overall Intersection***	43.2	D	0.83	LOS D	Y	355	425 (EBL)
								125	200 (WBL)
								175	200 (NBL)
03	Alberta and Interstate	***Overall Intersection***	42.9	D	0.90	LOS D	Y	125	200 (NBL)
								100	150 (SBL)
04	Alberta and SB I-5 Off-Ramp	***Overall Intersection***	18.5	B	0.56	0.85	Y	75	125 (WBL)
								175	175 (WBT)
05	Alberta and NB I-5 Off-Ramp	***Overall Intersection***	20.0	B	0.75	0.85	Y	75	125 (EBL)
								175	175 (EBT)
06	Alberta and MLK Jr.	***Overall Intersection***	45.6	D	0.88	LOS D	Y	100	175 (NBL)
								100	175 (SBL)
07	Rosa Parks and Interstate	***Overall Intersection***	45.4	D	0.77	LOS D	Y	100	125 (EBL)
								100	175 (WBL)
								175	300 (NBL)
08	Rosa Parks and I-5 SB On-/Off Ramps	***Overall Intersection***	15.5	B	0.54	0.85	Y	125	150 (SWR)
09	Rosa Parks and I-5 NB On-/Off Ramps	***Overall Intersection***	15.7	B	0.59	0.85	Y	190	225 (EBL)
10	Rosa Parks and MLK Jr.	***Overall Intersection***	19.5	B	0.82	LOS D	Y	100	150 (NBL)
11	Lombard and Interstate	***Overall Intersection***	> 100	F	0.92	0.99	Y	150	250 (EBL)
								1150	1150 (EBTR)
								150	275 (WBL)
								350	425 (NBL)
								100	175 (NBR)
								325	450 (SBL)
12	Lombard and I-5 SB On-Ramps	Eastbound Thru/Right	4.8	A	0.54	0.85	Y	-	-
13	Lombard and I-5 NB Off-Ramps	***Overall Intersection***	4.6	A	0.53	0.85	Y	-	-
14	Lombard and MLK Jr.	***Overall Intersection***	> 100	F	0.90	0.99	Y	100	175 (EBL)
								1750	1750 (EBTR)
								100	200 (WBL)
								100	200 (NBL)
								150	300 (SBL)
15	Interstate and Argyle	***Overall Intersection***	19.5	B	0.66	LOS D	Y	75	150 (EBR)
								50	75 (NBL)
								125	125 (NBT)
16	Columbia Blvd and I-5 Ramps	***Overall Intersection***	14.4	B	0.51	0.85	Y	-	-
17	Columbia Blvd and MLK Jr.	***Overall Intersection***	46.3	D	0.77	0.99	Y	350	425 (WBL)
								100	225 (NBL)
								225	400 (SBL)
18	Victory and Expo Road	***Overall Intersection***	5.4	A	0.41	LOS E	Y	-	-
19	Victory Blvd and I-5 SB On-Ramp	Westbound Left/Thru	2.0	A	0.18	0.85	Y	-	-
20	Victory Blvd and NB On-/Off-Ramps	***Overall Intersection***	13.5	B	0.50	0.85	Y	-	-
21	Union Ct and I-5 NB Off-Ramp								
22	Union Ct/Marine Way and Vancouver Way								
23	Marine Dr and I-5 On-/Off-Ramps	***Overall Intersection***	32.1	C	0.71	0.75	Y	-	-
24	Center Ave and I-5 SB On-/Off Ramps								
25	Hayden Island Dr and Hayden Island Dr South								
AA	Vancouver Way and MLK Jr. ramps	***Overall Intersection***	18.3	B	0.63	0.75	Y	-	-
BB	Vancouver Way and new underpass	***Overall Intersection***	27.7	C	0.62	LOS D	Y	-	-
CC	Union Ct and new underpass	Northbound Thru	5.3	A	0.48	LOS E	Y	-	-
DD	Union Ct and MLK ramps	Westbound Right	7.0	A	0.66	0.75	Y	-	-
EE	Connector Road and Marine Drive	***Overall Intersection***	12.5	B	0.66	LOS D	Y	-	-
FF	Hayden Island Northbound Off-Ramp	***Overall Intersection***	12.1	B	0.61	0.75	Y	-	-
GG	Hayden Island Southbound On-Ramp	***Overall Intersection***	5.2	A	0.52	0.75	Y	-	-
HH	Hayden Island Northbound On-Ramp	***Overall Intersection***	14.3	B	0.52	0.75	Y	-	-
II	Hayden Island Southbound Off-Ramp	***Overall Intersection***	7.6	A	0.52	0.75	Y	-	-
JJ	Hayden Island Drive and Jantzen Drive	***Overall Intersection***	11.1	B	0.61	0.85	Y	-	-
KK	Tomahawk Island Drive and Jantzen Drive	***Overall Intersection***	17.5	B	0.65	0.85	Y	-	-
LL	Jantzen Ave and Sunrise	Southbound Right	4.1	A	0.03	0.85	Y	-	-
MM	Jantzen Ave and Main Street	***Overall Intersection***	8.1	A	0.57	0.85	Y	-	-
NN	Hayden Island Drive and Main Street	***Overall Intersection***	21.6	C	0.56	0.85	Y	-	-
OO	Hayden Island Drive and Sunrise	Northbound Right	7.9	A	0.35	0.85	Y	-	-
PP	Local Bridge and Little Marine Drive								
QQ	Local Bridge and Tomahawk Is Drive								

2030 LPA Option B

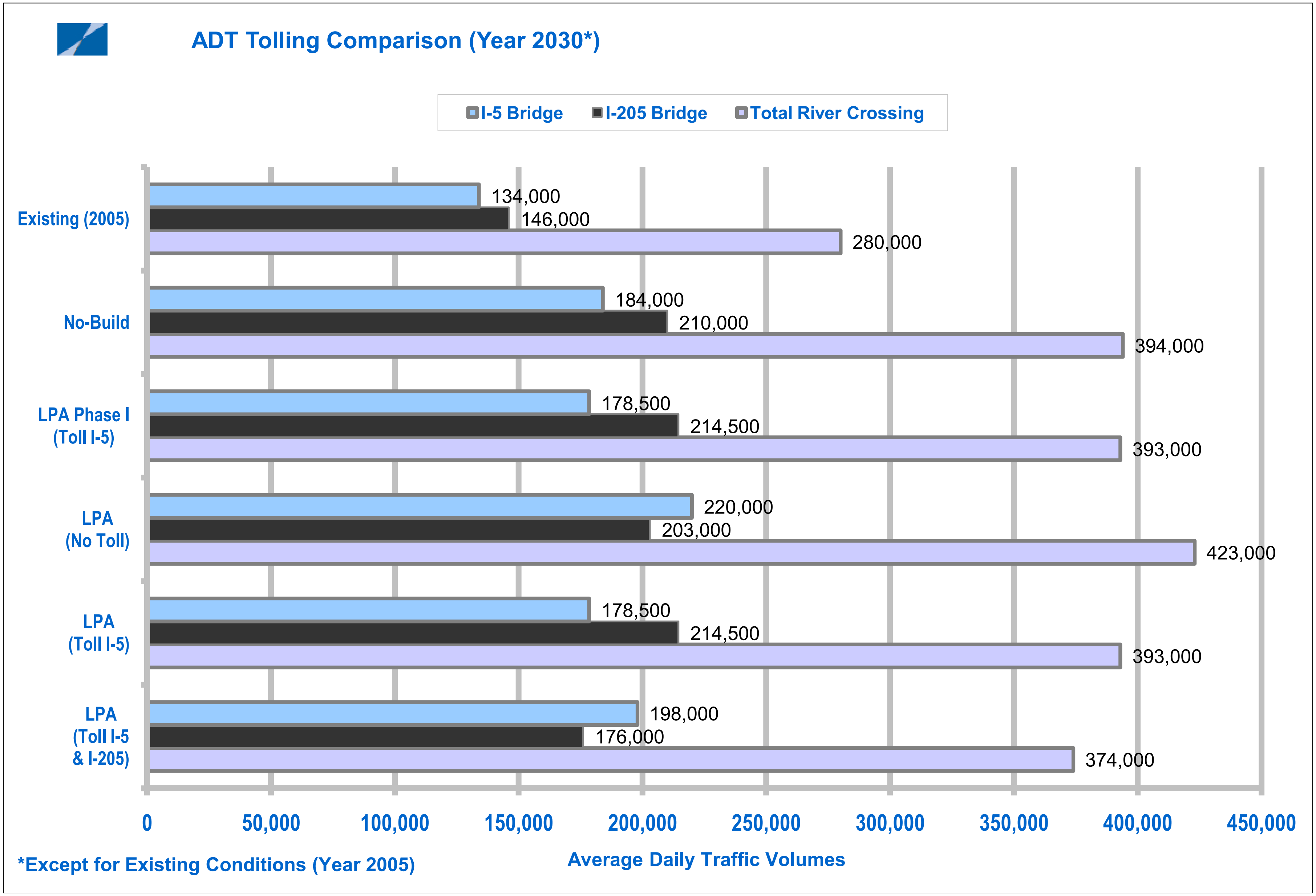
#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[3,4,5,6]	Meets Standard	Storage Length	95% Queue (ft)
01	Fremont and MLK Jr.	***Overall Intersection***	61.9	E	0.98	LOS D	Y*	125	150 (EBL)
								125	175 (WBL)
								125	150 (NBL)
								125	225 (SBL)
02	Going and Interstate	***Overall Intersection***	43.2	D	0.83	LOS D	Y	355	425 (EBL)
								125	200 (WBL)
								175	200 (NBL)
03	Alberta and Interstate	***Overall Intersection***	42.9	D	0.90	LOS D	Y	125	200 (NBL)
								100	150 (SBL)
04	Alberta and SB I-5 Off-Ramp	***Overall Intersection***	18.5	B	0.56	0.85	Y	75	125 (WBL)
								175	175 (WBT)
05	Alberta and NB I-5 Off-Ramp	***Overall Intersection***	20.0	B	0.75	0.85	Y	75	125 (EBL)
								175	175 (EBT)
06	Alberta and MLK Jr.	***Overall Intersection***	45.6	D	0.88	LOS D	Y	100	175 (NBL)
								100	175 (SBL)
07	Rosa Parks and Interstate	***Overall Intersection***	45.4	D	0.77	LOS D	Y	100	125 (EBL)
								100	175 (WBL)
								175	300 (NBL)
08	Rosa Parks and I-5 SB On-/Off Ramps	***Overall Intersection***	15.5	B	0.54	0.85	Y	125	150 (SWR)
09	Rosa Parks and I-5 NB On-/Off Ramps	***Overall Intersection***	15.7	B	0.59	0.85	Y	190	225 (EBL)
10	Rosa Parks and MLK Jr.	***Overall Intersection***	19.5	B	0.82	LOS D	Y	100	150 (NBL)
11	Lombard and Interstate	***Overall Intersection***	> 100	F	0.92	0.99	Y	150	250 (EBL)
								1150	1150 (EBTR)
								150	275 (WBL)
								350	425 (NBL)
								100	175 (NBR)
								325	450 (SBL)
12	Lombard and I-5 SB On-Ramps	Eastbound Thru/Right	4.8	A	0.54	0.85	Y	-	-
13	Lombard and I-5 NB Off-Ramps	***Overall Intersection***	4.6	A	0.53	0.85	Y	-	-
14	Lombard and MLK Jr.	***Overall Intersection***	> 100	F	0.90	0.99	Y	100	175 (EBL)
								1750	1750 (EBTR)
								100	200 (WBL)
								100	200 (NBL)
								150	300 (SBL)
15	Interstate and Argyle	***Overall Intersection***	19.5	B	0.66	LOS D	Y	75	150 (EBR)
								50	75 (NBL)
								125	125 (NBT)
16	Columbia Blvd and I-5 Ramps	***Overall Intersection***	14.4	B	0.51	0.85	Y	-	-
17	Columbia Blvd and MLK Jr.	***Overall Intersection***	46.3	D	0.77	0.99	Y	350	425 (WBL)
								100	225 (NBL)
								225	400 (SBL)
18	Victory and Expo Road	***Overall Intersection***	5.4	A	0.41	LOS E	Y	-	-
19	Victory Blvd and I-5 SB On-Ramp	Westbound Left/Thru	2.0	A	0.18	0.85	Y	-	-
20	Victory Blvd and NB On-/Off-Ramps	***Overall Intersection***	13.5	B	0.50	0.85	Y	-	-
21	Union Ct and I-5 NB Off-Ramp								
22	Union Ct/Marine Way and Vancouver Way								
23	Marine Dr and I-5 On-/Off-Ramps	***Overall Intersection***	13.1	B	0.46	0.75	Y	-	-
24	Center Ave and I-5 SB On-/Off Ramps								
25	Hayden Island Dr and Hayden Island Dr South								
AA	Vancouver Way and MLK Jr. ramps	***Overall Intersection***	17.1	B	0.63	0.75	Y	-	-
BB	Vancouver Way and new underpass	***Overall Intersection***	27.5	C	0.62	LOS D	Y	-	-
CC	Union Ct and new underpass	Northbound Thru	5.5	A	0.48	LOS E	Y	-	-
DD	Union Ct and MLK ramps	Westbound Right	7.3	A	0.66	0.75	Y	-	-
EE	Connector Road and Marine Drive	***Overall Intersection***	11.2	B	0.66	LOS D	Y	-	-
FF	Hayden Island Northbound Off-Ramp	***Overall Intersection***	15.3	B	0.61	0.75	Y	-	-
GG	Hayden Island Southbound On-Ramp	***Overall Intersection***	5.2	A	0.52	0.75	Y	-	-
HH	Hayden Island Northbound On-Ramp	***Overall Intersection***	14.3	B	0.52	0.75	Y	-	-
II	Hayden Island Southbound Off-Ramp	***Overall Intersection***	7.6	A	0.52	0.75	Y	-	-
JJ	Hayden Island Drive and Jantzen Drive	***Overall Intersection***	11.1	B	0.61	0.85	Y	-	-
KK	Tomahawk Island Drive and Jantzen Drive	***Overall Intersection***	17.5	B	0.65	0.85	Y	-	-
LL	Jantzen Ave and Sunrise	Southbound Right	4.1	A	0.03	0.85	Y	-	-
MM	Jantzen Ave and Main Street	***Overall Intersection***	8.1	A	0.57	0.85	Y	-	-
NN	Hayden Island Drive and Main Street	***Overall Intersection***	21.6	C	0.56	0.85	Y	-	-
OO	Hayden Island Drive and Sunrise	Northbound Right	7.9	A	0.35	0.85	Y	-	-
PP	Local Bridge and Little Marine Drive								
QQ	Local Bridge and Tomahawk Is Drive								

Delay / LOS affected by freeway congestion

Intersection queuing spills back into upstream intersection

Note 1 The ICU is used for signalized and AWSC intersections. The V/C is used for the critical movement at other intersections.
Note 2 The ODOT V/C standard of 0.85 is used for ramp terminals in the Existing and No-Build scenarios (Action 1F1)
Note 3 The ODOT V/C standard of 0.99 is used for ODOT-controlled intersections along Lombard Street (US-30) and MLK Jr. Boulevard (OR-99W), that are not ramp terminals, for the Existing, No-Build and LPA scenarios as stated in the OHP (Table 7, 2004 update).
Note 4 The PBOT operational standard for signalized intersections is LOS D and, for unsignalized intersections, is LOS E.
Note 5 The ODOT V/C standard of 0.85 is used for ramp terminals in the LPA scenarios that remain unchanged from the No-Build scenario, as stated in the Oregon Highway Plan (Action 1F1). New or reconstructed ramp terminals in the LPA scenarios have a V/C standard of 0.75 as stated in the Oregon Highway Design Manual (Table 10-1)
Note 6 The ODOT V/C standard of 0.85 is used for ODOT-controlled intersections along regional highways or district/local roads in the Build scenarios as stated in the Oregon Highway Design Manual (Table 10-1)
Y* Intersection does not meet the stated standard in the LPA scenarios, but meets the PBOT "do no worse" practice as compared to the No-Build.

Exhibit 4-32


ADT Tolling Comparison (Year 2030*)
I-5 Bridge
I-205 Bridge
Total River Crossing
Existing (2005)
134,000
146,000
280,000
No-Build
184,000
210,000
394,000
LPA Phase I (Toll I-5)
178,500
214,500
393,000
LPA (No Toll)
220,000
203,000
423,000
LPA (Toll I-5)
178,500
214,500
393,000
LPA (Toll I-5 & I-205)
198,000
176,000
374,000
0
50,000
100,000
150,000
200,000
250,000
300,000
350,000
400,000
450,000
Average Daily Traffic Volumes
*Except for Existing Conditions (Year 2005)

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5. Affected Environment / Existing Conditions

5.1 Description of Existing Facilities

5.1.1 I-5 and I-205 Roadway System Inventory

Interstate 5 was evaluated for traffic performance and safety considerations from the city of Ridgefield in Clark County to the Marquam Bridge in downtown Portland. This 23-mile highway segment generally consists of three mainline through-lanes in each direction and includes 23 interchanges. Speed limits are 70 miles per hour (mph) north of 179th Street, 60 mph between 179th Street and Mill Plain Boulevard, 50 mph from Mill Plain Boulevard to Marine Drive, 55 mph from Marine Drive to I-405, and 50 mph from I-405 to the Marquam Bridge.

The proposed project would rebuild I-5 within the 4.8-mile Bridge Influence Area. This area extends from the SR 500/39th Street interchange in Vancouver to near the Interstate Avenue/Victory Boulevard interchange in Portland. The following seven interchanges would be affected:

- SR 500/39th Street: A partially directional (SR 500) and diamond (39th Street) interchange configuration;
- Fourth Plain Boulevard: A diamond with one folded quadrant interchange configuration;
- Mill Plain Boulevard: A diamond interchange configuration;
- SR 14/City Center: A directional cloverleaf with flyover ramps;
- Hayden Island: Gull-wing interchange configuration;
- Marine Drive: Modified partial cloverleaf configuration; and
- Interstate Avenue/Victory Boulevard: A diamond interchange configuration.

In addition to I-5, traffic performance along a 9-mile segment of I-205 was evaluated. The segment extends from SR 500 in Vancouver to I-84 in Portland and generally consists of three mainline through-lanes in each direction, except across the Glenn Jackson Bridge, which has four lanes in each direction. There are seven interchanges along this segment of I-205 and the posted speed limit is 60 mph.

5.1.2 Local Streets

Seventy-three intersections in Vancouver and 25 intersections in Portland were studied to complement the analyses on I-5 and I-205. The study intersections were chosen based on discussions with WSDOT, ODOT, City of Vancouver, and City of Portland. The goal was to identify locations that might be potentially negatively or positively affected by the proposed project. An indexed list of Vancouver intersections studied is shown in **Exhibit 5-1**, followed by a corresponding map of the intersections in **Exhibit 5-2**. The indexed list of Portland intersections are shown in **Exhibit 5-3**, followed by a corresponding map of the intersections in **Exhibit 5-4**.

5.2 I-5 and I-205 Performance

This section summarizes existing 2005 performance for the I-5 and I-205 study areas. This data was collected in 2005.

5.2.1 Daily Traffic Levels

Average daily traffic volumes represent the average 24-hour weekday volume on a roadway segment. The I-5 bridge carried 134,000 vehicles each day in 2005. The I-205 Glenn Jackson Bridge, located six and one half miles to the east, carried 146,000 vehicles each day in 2005. **Exhibit 5-5** summarizes existing 2005 ADT volumes on the I-5 bridge, the I-205 bridge, and the total river crossing.

5.2.2 Traffic Demand – Vehicles

5.2.2.1 Peak Travel Patterns along I-5 in Bridge Influence Area

According to the analysis of results of regional transportation modeling performed by Metro, the average trip length of trips across the bridge during the four-hour PM peak period is in excess of 18.9 miles. Excluding the trips that pass through the Portland-Vancouver region, the average trip length is still in excess of 15.6 miles. This is in distinct contrast to the region's average trip length, which is calculated to be approximately six miles for all trips made within the region. Furthermore, the typical motorist's trip across the Interstate Bridge uses I-5 for only a short portion of their trip with much of their travel on regional arterials, collectors and local roads. Vehicle license plate surveys were undertaken in 2005 to determine where peak direction vehicle trips across the Interstate Bridge enter and exit I-5 or roadway ramps within the Bridge Influence Area. As shown in **Exhibit 5-6**, during the weekday morning peak, 25 percent of southbound traffic across the I-5 bridge traveled on I-5 from north of SR 500 to I-5 south of Columbia Boulevard. In other words, 75 percent of southbound morning traffic across the bridge entered and/or exited I-5 via a ramp in the Bridge Influence Area.

During the afternoon/evening peak, 32 percent of northbound traffic across the Interstate Bridge traveled on I-5 from south of Columbia Boulevard to I-5 north of SR 500, meaning that 68 percent of northbound afternoon/evening peak traffic across the bridge entered and/or exited I-5 via a ramp within the Bridge Influence Area (see **Exhibit 5-7**).

The 4.8-mile Bridge Influence Area provides connections to seven major roadways in both Vancouver and Portland. Peak period travel demand in I-5's study corridor, further discussed below, are the heaviest within the Bridge Influence Area due to the limited available crossings of the Columbia River and I-5's interface with key east-west highways and arterial roadways immediately north and south of the Columbia River. The high traffic demands, in combination with short spacing between on- and off-ramps, result in congested traffic conditions and safety issues.

5.2.2.2 Vehicle Demand on I-5

The terms “traffic demand” and “traffic throughput”, both used throughout this document, have different meanings. Traffic demand refers to the total number of motorists attempting to access the transportation system, including those caught in congestion. Traffic throughput is the total number of motorists actually able to travel through the transportation system in a measured time interval. When traffic demand exceeds traffic throughput, traffic congestion occurs and some motorists are forced to take an alternate route or experience delay.

Traffic volumes within the study area are typically at their highest on weekdays during the four-hour morning peak between 6 a.m. and 10 a.m. and during the four-hour afternoon/evening peak from 3 p.m. to 7 p.m. During the morning peak, southbound traffic demand is greatest, whereas northbound traffic demand is greatest during the afternoon/evening peak.

Exhibit 5-8 illustrates southbound I-5 four-hour morning peak traffic demands. Southbound traffic demand varies widely along the 23-mile study corridor, ranging from a low of about 10,000 vehicles near Pioneer Street in Ridgefield to a high of over 23,000 vehicles north of the I-5/I-405 split in Portland. Note that southbound traffic demand builds as one moves south toward the Interstate Bridge (four-hour demand of 20,200), then drops at the Marine Drive and Victory Boulevard interchanges (to about 15,000) before building again further south. During the four-hour morning peak, southbound traffic demands at the Interstate Bridge reach 20,200 vehicles, which exceed the capacity of the Interstate Bridge and result in substantial traffic congestion.

Exhibit 5-9 illustrates the northbound traffic demands during the four-hour morning peak. This is the same time period, but the opposite direction of the previous exhibit. Northbound traffic demands along the 23-mile corridor vary even more widely than in the southbound direction. As shown in **Exhibit 5-9**, the northbound four-hour morning demand is just under 20,000 vehicles at the Marquam Bridge in Portland. That drops to less than 8,000 with traffic exiting to I-84, but traffic demand increases with traffic added from Morrison and I-84 where it reaches 17,000. North of I-405, the demand follows a generally downward trend dropping to just under 10,000 at the Victory Boulevard interchange. Demand rises again with the addition of Marine Drive traffic (to about 13,000) before falling to about 5,000 during the four-hour morning peak at the 139th Street interchange.

Exhibit 5-10 illustrates the southbound four-hour afternoon/evening peak traffic demands along the I-5 corridor. Southbound I-5 traffic demand during the four-hour afternoon/evening peak is very similar to, but lower than, the four-hour morning peak. Southbound I-5 demand climbs from about 5,000 vehicles at the 139th Street interchange to about 15,000 vehicles at the Interstate Bridge during the four-hour afternoon/evening peak. Like the morning peak period, the southbound afternoon/evening peak demand drops after crossing the bridge before building again to a high of just under 20,000 vehicles north of the I-405 split in Portland. Demands then drop to about 13,000 after the I-405 split before rising again to almost 19,000 near the Rose Quarter during the four-hour afternoon/evening peak.

Exhibit 5-11 depicts the northbound four-hour afternoon/evening peak period travel demand in the I-5 corridor. South of Broadway/Weidler, northbound I-5 traffic demand is basically the same during the morning and afternoon/evening peak periods. However, north of Broadway/Weidler, northbound I-5 traffic demands are substantially higher during the afternoon/evening period than during the morning peak. Traffic demand where I-405 joins I-5 is about 20,000 during the four-hour afternoon/evening peak, but drops to about 16,000 at Victory/Denver before climbing to about 21,400 at the Interstate Bridge, exceeding I-5's capacity and resulting in substantial congestion, as discussed later in this chapter. Northbound traffic demands along the I-5 peak at almost 24,000 vehicles just north of Fourth Plain Boulevard in Vancouver before falling to a low of about 7,000 vehicles near 139th Street in Vancouver.

5.2.2.3 Vehicle Demand on I-205

Travel demand in the I-205 corridor is available for the two-hour morning and two-hour afternoon/evening peak periods, rather than the four-hour periods summarized for I-5.

Exhibit 5-12 illustrates the southbound I-205 two-hour morning peak traffic demand. Two-hour demand is close to 8,000 vehicles north of SR 500. It rises to more than 10,000 in the vicinity of SR 500, falls to 6,000 at 18th Street and peaks near 13,000 vehicles at the I-205 Glenn Jackson Bridge. Southbound demand drops to about 10,000 vehicles at Airport Way and decreases to 9,000 vehicles near I-84.

Exhibit 5-13 summarizes northbound I-205 two-hour morning peak traffic demands. The highest northbound demand is approximately 10,000 vehicles near I-84. It drops to less than 5,000 vehicles in the vicinity of SR 14 and declines to less than 3,000 at 28th Street.

Exhibit 5-14 summarizes southbound I-205 two-hour afternoon/evening peak traffic demands. Southbound demand is about 6,000 vehicles at SR 500, decreasing to 3,000 vehicles north of Mill Plain Boulevard. It increases approaching the Glenn Jackson Bridge to about 9,000. Traffic demand continues to grow in Portland reaching about 11,000 at Columbia Boulevard and then decreases approaching the I-84 interchange. South of Columbia Boulevard, the two-hour morning and afternoon/evening peak travel demands are very similar.

Exhibit 5-15 illustrates the northbound I-205 two-hour travel demand. South of I-84, the morning and afternoon/evening peak travel demands for I-205 are similar. North of I-84, the northbound I-205 two-hour traffic demands are higher during the afternoon/evening peak than during the morning peak. In the vicinity of Glisan Street, northbound travel demand is less than 9,000 vehicles during the two-hour afternoon/evening peak. That rises to near 14,000 vehicles on the Glenn Jackson Bridge. The northbound demand falls to less than 6,000 vehicles at 28th Street.

5.2.3 Traffic Demand – Truck Freight

The I-5 crossing is critical to national and international freight flow. I-5 serves direct international land connections to Mexico and Canada, and carries over 10 million tons of freight to and from California. National, West Coast, and regional freight flows depend daily on the efficient functioning of I-5 within the Bridge Influence Area.

Approximately 11,000 trucks crossed the I-5 bridges on an average weekday in 2005, accounting for over eight percent of all bridge traffic. On the I-205 crossing five percent of all traffic in 2005 is from trucks, with an average of 7,750 trucks per day. Although the I-5 crossing carries less total traffic than the I-205 crossing, it carries about 42 percent more trucks.

The rapid increase in freight volumes, particularly those carried by trucks, is well recognized by the Oregon and Washington transportation plans. Oregon and Washington combined have a $350 billion economy and export goods valued at $45 billion per year. The six most freight-intensive industry sectors sensitive to transportation along Portland-Vancouver highways and rail corridors are wood and paper products, transportation equipment, steel, farm and food products, high technology, and distribution and wholesale trade. These industries account for approximately 70 percent of the commodity tonnage crossing the Columbia River via I-5 and I-205 on large trucks.

Truck trips are associated with certain industries. Manufacturing industries tend to produce and attract long-haul truck trips that originate over 250 miles from their destination. Manufacturers also attract and generate short-haul trips to and from ports and other local manufacturers. Wholesalers, which distribute goods throughout the region, attract long-haul and short-haul truck trips, and generate the majority of local truck trips (less than 50 miles long). Retail establishments are the primary attraction for local distribution truck trips generated by the wholesale industries.

The main sources of regional truck traffic are the Port of Portland, the Columbia Corridor industrial area, the Port of Vancouver, and the Columbia Industrial Park in Washington. **Exhibit 5-16** provides a corridor view of the relationship between truck trips and land uses that generate truck trips. The midday hourly truck volumes are compared to overall hourly volumes to illustrate that trucks prefer to travel during this time. The highest truck demands occur in the vicinity of Columbia Boulevard and Marine Drive interchanges. In Washington, regional truck movements are highest by the SR 14 and Mill Plain Boulevard interchanges.

Interstate 5 is the primary truck route for local, regional, national, and international movement of goods through the Portland-Vancouver region. As shown in **Exhibit 5-17**, trucks carry 67 percent of all freight in the region today, twice as much freight in the Portland-Vancouver region than the other five modes (rail, ocean, barge, pipeline, and air) combined.

5.2.3.1 Oversized Loads

Trucks carry oversize loads on a daily basis through the Bridge Influence Area. Oversize loads are trucks carrying goods that cause them to be over-length, over-height, over-width, and/or over-weight. On highways and arterials, the primary limiting factor for oversize load route choice is vertical clearance.

Within the Bridge Influence Area there are unique and strategically important oversize load transport routes. For example, the Port of Vancouver currently generates over-length and over-height loads of wind turbines and wind turbine parts going to eastern Washington and Oregon wind energy farms. These shipments leave the Port of Vancouver on Mill Plain Boulevard, enter I-5 southbound, and exit to SR 14 eastbound. The Columbia Industrial Park generates oversize loads destined for the Port of Vancouver and to points north and south on I-5. These loads travel westbound on SR 14 towards I-5, access I-5 (northbound or southbound), and exit onto Mill Plain Boulevard. In Oregon, the high-volume oversize load activity occurs on I-5 and exits I-5 southbound at Marine Drive to access Martin Luther King Jr. Boulevard, or exits I-5 northbound at Columbia Boulevard to access the Columbia Corridor industrial area and the Port of Portland.

5.2.3.2 Freight Rail

Two Class I freight railroad mainlines pass through the Bridge Influence Area. As shown in **Exhibit 5-17**, freight rail carries 11 percent of the regional freight tonnage. The Union Pacific's (UP) Portland-to-Hinkle line passes under I-5 south of Columbia Boulevard. The UP railroad line also crosses over Columbia Boulevard on the west side of I-5. On the north side of the river, the Burlington Northern Santa Fe Railway's (BNSF) Columbia River route crosses over I-5 between the Columbia River and SR 14. The BNSF line serves the Port of Vancouver, the Port of Portland and points east and north. The BNSF owns and operates a double-tracked swing-span bridge over the Columbia River located approximately one mile downstream of the Interstate Bridge. Union Pacific has trackage rights on the BNSF Columbia River Bridge and on the BNSF mainline north to the Seattle area.

5.2.4 Effects of Congestion

5.2.4.1 Duration of Congestion on Southbound I-5

Travel speed and traffic congestion profiles were created to show travel speeds at different locations along the I-5 corridor at different times of day. The regional travel demand model provided four-hour morning (6–10 a.m.) and four-hour afternoon/evening (3–7 p.m.) traffic forecasts. The forecast information was post-processed and input into the VISSIM traffic operations model to estimate travel speeds by location throughout the two peak periods. This data was summarized by 15-minute time increments to create an accurate picture of beginning and end of congestion at each specific location.

Using the eight hours of VISSIM results, interpolation and extrapolation between and outside of these time periods was performed to develop 16-hour profiles. These profiles, encompassing the period from 5 a.m. to 9 p.m., assist in assessing early morning, midday, and afternoon/evening effects. The interpolation/extrapolation technique used non-peak period speed and travel time data collected for the CRC project, archived loop detector data, observations from highway cameras, and corridor speed plots available from the Oregon and Washington departments of transportation.

Exhibit 5-18 shows the existing conditions along southbound I-5 (y-axis) by time of day (x-axis). Different colors represent varying speeds summarized by location. Red represents 0-10 mph, dark orange represents 10-20 mph, light orange represents 20-30 mph, yellow represents 30-40 mph, light green represents 40-50 mph, and dark green represents greater than 50 mph. Congestion is defined in this study as occurring when travel speeds are less than 30 mph.

As shown in **Exhibit 5-18**, under existing conditions I-5 undergoes a fairly regular operational cycle in both directions of travel during typical weekday conditions. In the morning peak congestion and queuing occur at four southbound locations: 1) I-5 bridge, 2) Delta Park lane drop, 3) north of the I-405 split, and 4) the Rose Quarter/I-84 off-ramp section. The queues are caused by capacity restrictions and disruptions in traffic flow due to inadequate merging, diverging, and weaving distances for vehicles. These bottlenecks interact with each other and control the flow throughput of upstream locations.

The Interstate Bridge is generally congested for two hours during the morning as a result of the bridge’s limited capacity and the downstream Delta Park bottleneck. Three hours of congestion generally occurs at Delta Park lane drop during the morning peak. About 2.5 hours of congestion occur north of the I-405 split due to high traffic demands within the three-lane section north of the I-5/I-405 split.

During the afternoon/evening peak, southbound congestion and vehicular queuing occurs at two bottleneck locations: 1) north of the I-405 split, and 2) the Rose Quarter/I-84 off-ramp section.

In addition, midday queuing and related congestion occurs at the Delta Park lane drop and Rose Quarter/I-84 off-ramp section. This queuing occurs independently of peak commute period congestion and lasts multiple hours throughout the day.

5.2.4.2 Duration of Congestion on Northbound I-5

Northbound I-5 experiences multiple hours of congestion along I-5 between Portland, Oregon and Ridgefield, Washington. **Exhibit 5-19** summarizes the duration of congestion for existing conditions between 5 a.m. and 9 p.m. During the afternoon/evening peak, northbound congestion and vehicular queuing occurs at two distinct locations:
1) Broadway Avenue on-ramp and I-405 off-ramp, and 2) the Interstate Bridge.

The Interstate Bridge bottleneck, which lasts for four hours, is more restrictive and extends longer than the Broadway/I-405 bottleneck, which lasts almost two hours. During the morning travel period, queuing occurs between the I-84 on-ramp and the I-405 off-ramp and extends for almost two hours.

5.2.5 Travel Times

5.2.5.1 Travel Times along I-5

Peak period travel times during the two-hour morning peak are summarized for southbound I-5 in **Exhibit 5-20**. The southbound travel time between SR 500 and

Columbia Boulevard (5.2 miles) is 16 minutes and between 179th Street and I-84 (16.6 miles) is 31 minutes.

Travel times during the two-hour afternoon/evening peak are summarized for northbound I-5 in **Exhibit 5-21**. The northbound travel time between Columbia Boulevard and SR 500 is 12 minutes and between I-84 and 179th Street is 38 minutes.

5.2.5.2 Travel Times along I-205

Peak period travel times during the two-hour morning peak are summarized for southbound I-205 in **Exhibit 5-22**. The southbound travel time between SR 500 and I-84 (10.6 miles) is 11 minutes. The Washington portion of this trip between SR 500 and the midpoint on the Glenn Jackson Bridge is six minutes; the Oregon portion is five minutes.

Northbound I-205 travel times during the two-hour afternoon/evening peak are summarized in **Exhibit 5-23**. The northbound travel time between I-84 and SR 500 is 14 minutes. The Oregon portion of this trip between I-84 and the midpoint on the Glenn Jackson Bridge is eight minutes; the Washington portion is six minutes.

5.2.6 Service Volumes – Vehicles

5.2.6.1 Vehicle Throughput (Served Volume) on Southbound I-5

In addition to the travel speed and traffic congestion profiles, served traffic volume and travel speed profiles were developed to show the different levels of throughput between alternatives, as shown in **Exhibits 5-24** and **5-25**. The previously identified constraints along I-5 (defined in **Sections 5.2.4.1** and **5.2.4.2**) limit the amount of vehicular demand that can be served along the corridor in the peak travel directions during the morning and afternoon/evening peaks. These diagrams were created to compare, on an hour-by-hour basis, traffic levels served along various locations of the highway corridor. Color codes, consistent with those used for the travel speed and traffic congestion profiles, illustrate average hourly travel speeds.

Exhibit 5-24 shows the levels of southbound vehicular throughput versus travel speeds along the 23-mile I-5 study corridor during the four-hour morning peak. As shown, the highest service volumes occur in the vicinity of Going Street. The relationship between travel speed and service volume can be compared at any point along the corridor for each of the four hours of the morning peak period. Within the Bridge Influence Area, for example, the graphic shows that as volume rises during the second hour, the speed deteriorates. During the third hour, speed deteriorates further, though service volumes remain the same. Finally, speeds begin to recover during the fourth hour of the morning peak. The graphic also illustrates how congestion occurs at the previously identified four southbound bottlenecks influences the upstream corridor.

5.2.6.2 Vehicle Throughput (Served Volume) on Northbound I-5

Exhibit 5-25 shows the levels of northbound vehicular throughput during the four-hour afternoon/evening peak. The highest service volumes occur in the vicinity of the Morrison Bridge and 134th Street in the north part of Vancouver. The graphic illustrates how travel speeds change from hour to hour and the effect on the upstream corridor from the bottleneck in the vicinity of Marine Drive that begins to occur during the first hour of the afternoon peak. The graphic also illustrates the congestion dissipates with increases in travel speed during the last hour of the afternoon/evening peak. Within the Bridge Influence Area, the highest vehicle throughput occurs on the fringes of the afternoon/evening peak. The northbound vehicle throughput reaches 20,500 vehicles at the Interstate Bridge.

5.2.7 Service Volumes – Trucks

The data and analysis of truck volumes include all medium and heavy trucks. The terms “medium” and “heavy” refer to specific classes in the Federal Highway Administration’s (FHWA) 13 vehicle-type classification system. Medium trucks are single unit trucks with three or four axles and comprise FHWA Class 6 and 7. Heavy trucks include all tractor-trailer configurations and may include more than one trailer. Heavy trucks fall into FHWA Classes 8, 9, 10, 11, 12, and 13.

Although I-5 carries less total daily traffic than I-205 across the Columbia River, the I-5 bridge carries about 3,200 (42 percent) more medium and heavy trucks per day than the I-205 bridge. This differential may be explained by a number of factors. During uncongested periods, regional truck through-trips typically remain on I-5 because it provides a shorter and faster route than I-205 (the travel distance on I-5 from the south I-205 junction to the north I-205 junction is 28.1 miles, while the travel distance between the two junctions on I-205 is 37.3 miles). Distance is a cost factor for a truck trip and includes the cost of truck operations, fuel, and travel time for the driver. During congested conditions some through trucks avoid I-5 and divert to I-205.

Exhibit 5-26 presents the daily northbound and southbound volume of medium and heavy trucks on I-5 at several locations. The last pair of columns on the right of the exhibit shows I-205 on the Glenn Jackson Bridge for comparison.

Exhibit 5-26 shows that the highest truck volume in the I-5 study area occurs north of I-405. Northbound truck volume in this segment is higher than southbound volume. The daily truck volume between Lombard Street and Columbia Boulevard is 12 percent of all daily traffic at this location, and over the Interstate Bridge trucks constitute eight percent of all traffic.

Exhibit 5-27 shows the daily southbound hourly traffic volumes for general purpose and truck traffic over the Interstate Bridge in 2005. Traffic volumes across the Interstate Bridge are relatively similar between 6 a.m. and 6 p.m., except for the morning peak hours. Truck volumes are highest during the midday during regular business hours, to take advantage of less congested highway conditions. On the Interstate Bridge, trucks make up between nine and 10 percent of all traffic between 9 a.m. and 2 p.m. During the late evening and early morning hours, trucks constitute a much larger percentage of total highway traffic, reaching almost one quarter of all traffic at 2 a.m. The morning and afternoon/evening peaks have smaller truck shares of overall traffic.

Northbound 2005 hourly traffic volumes for general purpose and truck volumes are shown in **Exhibit 5-28**. Unlike the southbound direction, there are clearly higher volumes during the afternoon/evening peak period in the peak northbound commuting direction. Traffic volumes steadily increase from the early morning hours until 6 p.m. The late morning and midday hours between 8 a.m. and 1 p.m. experience truck percentages that exceed the daily average. Trucks constitute a large portion of traffic during the early morning hours, with more than one third of vehicles during the 4 a.m. hour. The volume of trucks relative to the total traffic volume is smaller during the afternoon/evening peak when congestion occurs and traffic speeds are slow, especially between 5 p.m. and 7 p.m.

Exhibit 5-29 presents medium and heavy truck volumes in 2005 from 7 a.m. to 7 p.m. Approximately 42 percent of the daily truck volume occurs between 9 a.m. and 3 p.m. when conditions are generally uncongested and travel times are more reliable for truck movement. Approximately 18 percent of the truck volume occurs during the afternoon/evening peak, from 3 p.m. to 7 p.m., when over 1,000 trucks travel northbound and 1,100 trucks travel southbound across the bridge. Almost 30 percent of daily truck travel across the I-5 bridge occurs during the late evening and early morning hours between 7 p.m. and 7 a.m.

5.2.8 Served vs. Unserved Ramp Volumes

5.2.8.1 Served vs. Unserved Ramp Volumes on Southbound I-5

Existing morning peak served versus unserved on-ramp volumes are summarized for southbound I-5 in **Exhibit 5-30**. The morning peak ramp demands are served at all southbound on-ramps within the I-5 Bridge Influence Area except for at the southbound SR 14/City Center on-ramp which is estimated to have 600 unserved vehicles over the four-hour period.

5.2.8.2 Served vs. Unserved Ramp Volumes on Northbound I-5

Existing afternoon/evening peak served versus unserved on-ramp volumes are summarized for northbound I-5 in **Exhibit 5-31**. All of the northbound I-5 on-ramps within the Bridge Influence Area are able to serve the four-hour travel demand throughout the afternoon/evening peak.

5.2.9 Person Throughput

About 21,400 persons in vehicles and 1,500 persons in buses cross the I-5 bridge southbound during the four-hour morning peak. During the afternoon/evening peak, about 24,600 persons in vehicles and 1,200 persons in buses travel over the bridge northbound. **Exhibit 5-32** shows peak north and southbound person throughput across the I-5 bridge.

5.2.10 Bridge Lifts

Bridge lift, or more specifically, gate closure data for the Interstate Bridge was obtained from ODOT for the three-year period from January 1, 2005 to December 31, 2007. The data was analyzed for the number of times traffic was stopped by the signals for gate closures, average time that the closures began, day of closures, duration of closures, the reason for closures, and the direction of traffic requiring closure.

The gate closure data revealed that not all gate closures involved lifting of the bridge spans. Also, depending on the reason for closure, the traffic may be stopped in one direction, or both directions of traffic. Generally, a bridge closure may result due to the following four reasons:

1. Cargo Boats: The bridge spans are lifted for the passage of commercial vessels. Auto and non-auto traffic is stopped along both northbound and southbound directions.
2. Non-commercial Boats: The bridge spans are lifted for the passage of non-commercial vessels. Auto and non-auto traffic is stopped along both northbound and southbound directions.
3. Maintenance: The bridge spans are lifted to allow for maintenance. Individual east or west spans of the Interstate Bridge may be maintained at the same time or different times. Accordingly, auto and non-auto traffic are closed in either one or both directions.
4. Stoppage: Gates are closed to stop auto and non-auto traffic (northbound and/or southbound) but without requiring a bridge lift. The stoppage may be due to several reasons including maintenance. Accordingly, auto and non-auto traffic are closed in either one or both directions.

In addition to the above mentioned reasons, sometimes gates may be closed with or without the bridge span lift to allow for the on-site training of the DOT personnel. For the current analysis, DOT training related closures were either summarized under Maintenance or Stoppage categories, depending on the reason for training.

The detailed results for the bridge gate closure data are presented below and are divided into two sections. The first section presents the gate closure results for all 365 days of the year (weekday and weekend) for the three-year period. Since higher traffic demands occur on weekdays and traffic modeling for the Columbia River Crossing project focuses on weekdays, the second section presents the results for the three-year period for weekday gate closures.

5.2.10.1 Gate Closure Statistics for All Days

Overall, there were a total of 1,401 gate closures recorded over the three-year period. On average, this works out to be 467 closures per year and 1.28 closures per day. Over half of the closures that occurred were for maintenance involving a bridge lift (51 percent). About one-third (32 percent) of the closures were for bridge lifts related to cargo or non-commercial boats. The remaining 17 percent of the gate closures were due to stoppages that did not involve a bridge lift.

Additionally, of the total maintenance and stoppage closures recorded, only half (50 percent) included a directional designation. It wasn't clear what direction of traffic had been impacted by the remaining half of the traffic closures. For the maintenance and stoppage closures with directional indication, 80 percent were directional (either northbound or southbound) and 20 percent were for both directions. The uni-directional closures were split at approximately 50/50.

Due to the high volume of traffic crossing the bridge during weekday peak periods, bridge closures are restricted (not prohibited, i.e. under some circumstances bridge closures may be allowed) from 6:30 a.m. to 9:00 a.m. and 2:30 p.m. to 6:00 p.m., resulting in most closures occurring at night. Of the data analyzed, nearly three-quarters (74 percent) of all closures occurred during the overnight hours (6:00 p.m. to 6:30 a.m.). Of the closures occurring during the overnight hours, 62 percent were for maintenance, 20 percent were for cargo or non-commercial boats, and 17 percent were stoppages.

5.2.10.2 Gate Closure Statistics for Weekdays

The three-year data was further evaluated for weekdays only. For the weekdays, there were 1,155 traffic closures from 2005 to 2007. The analysis showed that on an average more than one closure was likely during any given weekday (about 1.48 closures per weekday) versus on an average not all weekend days had a closure (0.78 closures per weekend day (Saturday or Sunday).

On weekdays, about 57 percent of the total closures were for maintenance, about 26 percent were cargo boat or non-commercial boat related, and only 18 percent were stoppages. Of the maintenance and stoppage closures that were classified by direction, 86 percent stopped one direction (43 percent northbound and 43 percent southbound) and 14 percent stopped both directions of traffic.

Also, during the weekdays, approximately 81 percent of all closures occurred between 6:00 p.m. and 6:30 a.m. Nearly two-thirds of these overnight closures were for maintenance (66 percent) and the remaining were traffic stoppages (17 percent) and for cargo or non-commercial boats (17 percent). In addition, about 18 percent of the weekday total closures occurred between 9:00 a.m. to 2:30 p.m. and were either for boat-passage (61 percent), stoppage (20 percent), or maintenance (19 percent). Although bridge lifts are restricted during the weekday rush hour, about 0.3 percent of all closures (3 maintenance lifts) occurred in the morning peak period (6:30 a.m. to 9:00 a.m.) and about 0.7 percent of all closures (six boat lifts and two stoppages) occurred in the evening peak period (2:30 p.m. to 6:00 p.m.).

The in-depth analyses of data showed that the typical weekday bridge closure included the following characteristics:

1. The likelihood of a bridge gate closure was noted to be highest during the night hours and peaked around midnight (12:00 a.m. to 1:00 a.m.). **Exhibit 5-33** shows the relative number and proportion of average weekday traffic closures by hour.

2. There were no recorded closures during the peak of the peak periods: the 7:00 a.m. hour and the 5:00 p.m. hour.

3. The average duration of closures, classified by reason of closure, showed that:

- Overall, weekday closures were 10.6 minutes long.
- Traffic Stoppage (without lift) related closures lasted four minutes, and
- Closures involving bridge lifts (maintenance or cargo or non-commercial boat passage related) ranged from 10.5 to 12.0 minutes.

While the number of weekday bridge gate closures was consistently higher in the overnight hours, this cannot be said for their durations (refer to **Exhibit 5-34**). The average duration of bridge gate closure varied over the day and on an hourly basis and impacted traffic between 4.5 and 20 minutes.

5.2.11 Safety

This section provides an overview of vehicular collision analysis conducted for the CRC Bridge Influence Area. Vehicular collision analyses were conducted to determine historic crash rates, crash types and severities, and to ascertain how existing non-standard highway geometrics, I-5 lift bridge operations, traffic volumes, and traffic congestion correlate with the highway corridor's crash history.

5.2.11.1 Number of Vehicular Collisions and Collision Rates

A review of motor vehicle collisions reported within and slightly outside the Bridge Influence Area was conducted. Collision data was obtained from both the Washington and the Oregon departments of transportation for the five-year period from January 1, 2002 to December 31, 2006.

During the five-year period, 2,051 collisions were reported on the I-5 mainline and ramps within the Bridge Influence Area. There are no estimates available for the number of collisions that did not meet the criteria for crash reporting or were not reported for other reasons. There was an average rate of 1.12 reported collisions per day. The rate of 1.12 collisions per day was determined by dividing the number of days in the five-year study period (1,826) into the total number of collisions during the five-year study period (2,051).

The standard transportation engineering method of reporting collision rates are in collisions per million vehicle-miles traveled (MVMT). The average collision rate for "urban city interstate highways" in Oregon during the five-year study period is 0.55 collisions per MVMT. The average crash rate for "urban interstates" throughout the state of Washington for the year 2004-2006 (data is not available for 2002 or 2003) is 1.41 collisions per MVMT. For WSDOT's SW Region, which includes the segment of I-5 in the Bridge Influence Area, the average crash rate for "urban interstates" is 0.99 collisions per MVMT. WSDOT's collision rate calculations for interstate highways, unlike ODOT, take into account collisions that occur on the on- and off-ramps adjoining the highway system. This has the effect of adding more collisions to the overall rate calculation, resulting in generally higher collision rates; the difference in methodology also reduces the ability to compare the collision rates across the two states.

The collision rate experienced on I-5 within the Oregon segment of the Bridge Influence Area, was 1.08 collisions per MVMT. This rate is nearly twice that of the comparable statewide average of 0.55 collisions per MVMT. The collision rate experienced within the Washington segment of the Bridge Influence Area was 1.58 collisions per MVMT. This rate is nearly 60 percent higher than the most comparable rate (0.99 collisions per MVMT) for WSDOT's SW Region.

5.2.11.2 Vehicular Collisions by Type and Severity

The number, type and severity of collisions reported during the five-year period were compiled and plotted by direction (northbound and southbound) in 0.1-mile increments on maps of I-5. Four collision types were reported: rear-end, side-swipe, fixed object, and other. Three severity types were reported: property damage only (PDO), injury, and fatality.

Exhibit 5-35 shows the total number and type of collisions reported within the Bridge Influence Area in Washington for each tenth of a mile segment and for the ramp sections. **Exhibit 5-36** shows the number and type of collisions reported within the Bridge Influence Area in Oregon for each tenth of a mile segment and ramp sections. A high percentage of the reported collisions occurred near the approaches to the Interstate Bridge on either side of Columbia River. Other notable collision locations in Washington included southbound I-5 at SR 14, between SR 500 and the Fourth Plain Boulevard interchange, and near the Mill Plain Boulevard interchange. In Oregon high collision locations were on Hayden Island, at Victory Boulevard, Columbia Boulevard and Lombard Street interchanges.

In Washington, the total of southbound collisions was nearly three times those northbound. Fifty-seven percent of these collisions were rear-ends and 15 percent were side-swipes. Southbound collisions were much higher than northbound collisions, reflecting recurrent southbound traffic congestion at and near the bridgehead to the Interstate Bridge.

In Oregon, the percent of northbound collisions were approximately double those southbound. Seventy-seven percent of these collisions were rear-ends and 13 percent were side-swipes. Northbound crashes were much higher than southbound crashes in Oregon, also reflective of high northbound congestion levels at and near the I-5 bridge bridgehead.

Exhibit 5-37 shows the number and severity of collisions reported within the Bridge Influence Area in Washington. **Exhibit 5-38** shows the number and severity of collisions reported within the Bridge Influence Area in Oregon. The majority of crashes were identified as property damage only, and accounted for approximately 61 percent of the total. Injury crashes accounted for almost all the remainder of the crashes, or nearly 39 percent. Injury crashes were more prevalent in the peak direction of travel: southbound in Washington, northbound in Oregon.

Three fatalities occurred during the five-year crash study period between 2002 and 2006, representing 0.1 percent of all collisions. The three fatalities involved either a pedestrian or a bicyclist being struck by a vehicle or truck. Two of the three crashes occurred on southbound I-5 near the Interstate Bridge, one near the Hayden Island southbound on-ramp and one near the southbound SR 14 on-ramp. The third fatality occurred along northbound I-5 near the Victory Boulevard off-ramp.

ODOT calculates fatal and serious injury collision rates for jurisdiction and functional classifications by summing the total number of collisions classified as fatalities (coded in the ODOT crash database as ‘K’) or as Injury A (coded as ‘A’) and dividing by the appropriate vehicle miles traveled (VMT) data. The units for the resultant Fatal and Injury ‘A’ is per 100 million VMT, rather than the one million vehicle miles traveled (MVMT) used for the collision rates described in **Section 5.2.11.1**. WSDOT calculates a rate for fatalities only (based on 100 million VMT), a rate for injury crashes only (based on MVMT), and a rate for PDO crashes (based on MVMT).

An examination of the ODOT fatal and Injury A collision rate data for the three-year period between 2004 and 2006 (2002 and 2003 are not available) shows an average fatal and Injury A collision rate of 1.43 collisions per 100 million VMT. During the five-year crash study period, the comparable fatal and Injury A collision rate for the Oregon segment of the CRC project area is 1.66 collisions per 100 million VMT, 16 percent higher than the equivalent statewide rate.

An examination of WSDOT’s SW Region fatal collision rate data for the three-year period between 2004 and 2006 (2002 and 2003 are not available) shows an average fatal collision rate of 0.15 collisions per 100 million VMT. During the five-year crash study period, the comparable fatal collision rate for the Washington segment of the CRC project area is 0.13 collisions per 100 million VMT, nearly identical to the equivalent rate.

An examination of WSDOT’s SW Region injury collision rate data for the three-year period between 2004 and 2006 (2002 and 2003 are not available) shows an average injury collision rate of 0.38 collisions per MVMT. During the five-year crash study period, the comparable injury collision rate for the Washington segment of the CRC project area is 0.61 collisions per MVMT, 60 percent higher than the equivalent injury collision rate.

An examination of WSDOT’s SW Region PDO collision rate data for the three-year period between 2004 and 2006 (2002 and 2003 are not available) shows an average PDO collision rate of 0.61 collisions per MVMT. During the five-year crash study period, the comparable injury collision rate for the Washington segment of the CRC project area is 0.97 collisions per MVMT, nearly 60 percent higher than the equivalent PDO collision rate.

5.2.11.3 Relationship of Vehicular Collisions to Highway Geometrics

While the highway and bridge design generally met design standards applicable at the time of their construction, vehicles have changed and standards have evolved over the years, reflecting continued research in areas such as vehicle operating characteristics, driver expectations, traffic flow theory, and physical highway elements.

The FHWA has designated 12 geometric controlling criteria that have a primary importance for safety. These criteria are: design speed, grade, lane width, stopping sight distance, shoulder width, cross-slope, bridge width, superelevation, horizontal alignment, horizontal clearance, vertical alignment, and vertical clearance.

The Washington and Oregon departments of transportation have developed geometric design standards related to each of the 12 controlling criteria. Their current design standards were compared to I-5 existing geometrics within the Bridge Influence Area. Particular emphasis was placed on the following elements, each related to one or more of the above criteria:

- Ramp-to-highway acceleration lane length;
- Highway-to-ramp deceleration lane length;
- Ramp-to-ramp separation length;
- Turning roadway – ramp merge;
- Turning roadway – ramp split;
- Highway vertical alignment;
- Highway horizontal alignment;
- Highway weaving area lane length; and
- Highway shoulder width.

Non-standard geometric features exist throughout the I-5 Bridge Influence Area, including short ramp merges/acceleration lanes, short ramp diverges/deceleration lanes, short weaving areas, vertical curves (crest and sag curves) limiting sight distance, and narrow shoulders. The greatest concentration of existing non-standard geometric features is located on the Interstate Bridge and along its approaches. Within this area, there are multiple existing non-standard features. **Exhibit 5-39** lists existing non-standard features on I-5 in the Bridge Influence Area and the degree to which the elements meet current design standards. An assessment, conducted along the entire 5-mile Bridge Influence Area segment, found the presence of 40 non-standard features.

Many ramps within the extent of the Bridge Influence Area do not provide standard acceleration or deceleration lane lengths and some weaving areas are also non-standard. Non-standard shoulder widths are prevalent throughout the Bridge Influence Area.

Based upon a comparison of the non-standard geometric features and reported collisions, there is a strong correlation between the presence of non-standard design features and the frequency and type of collisions.

For example, non-standard acceleration and deceleration lanes at several on- and off-ramps contribute to a high number of rear-end and side-swipe collisions along northbound I-5, particularly on Hayden Island, the downtown Vancouver/City Center off-ramp, and at SR 14. Along southbound I-5, non-standard acceleration and deceleration lanes contribute to a high number of rear-end and side-swipe collisions at Fourth Plain Boulevard, SR 14, on Hayden Island, and at the Victory Boulevard interchange.

Existing non-standard weaving areas contribute to a high number of rear-end and side-swipe collisions along I-5, primarily southbound between SR 500 and Fourth Plain Boulevard, between Mill Plain Boulevard and SR 14, between Hayden Island and Marine Drive, and between Marine Drive and Victory Boulevard.

The distances between the SR 14 and City/Center off-ramps on the north end of the Interstate Bridge and other ramps in the Bridge Influence Area are below standard. The bridge's vertical alignment contains non-standard crest and sag curves that results in limited sight distance. The shoulders on the Interstate Bridge and other areas in the Bridge Influence Area are significantly below standards. All of these geometric elements contribute to the number of reported collisions near or at the Interstate Bridge.

5.2.11.4 Vehicular Collisions during Interstate Bridge Gate Closures

An analysis to determine the probability of collisions during gate closures was completed. The gate closure data for the Interstate Bridge was analyzed for the number of times traffic was stopped by the signals for the gate closures, average time that closures began, day of closures, duration of closures, the reason for closures, and the direction of traffic requiring closure.

Using a five-year collision database (for years 2000-2004), a comparison was made between collisions that were reported to have occurred within a one-hour window of logged gate closures on weekdays between 9:00 a.m. and 2:30 p.m. The analysis only considered collisions that involved vehicles approaching the bridge (i.e., northbound Oregon traffic or southbound Washington traffic) as gate closures directly impact only approaching traffic.

Based on the results of the analysis, northbound collisions are three times more likely when a gate closure occurs than when it does not. Southbound collisions are four times more likely. Collisions occurring during gate closures generally result in a higher rate of rear-end collisions and greater injury frequency than those collisions that occur during peaks, when gate closures are restricted (not prohibited).

5.2.11.5 Vehicular Collisions by Time of Day

The number and type of collisions reported in the I-5 Bridge Influence Area during the five-year period were sorted by hour and direction. **Exhibit 5-40** shows the number of collisions, by hour, reported along southbound I-5. **Exhibit 5-41** shows the number of collisions, by hour, reported along northbound I-5. Graphical curves depicting existing traffic counts on the Interstate Bridge were added to **Exhibit 5-40** and **Exhibit 5-41** to determine if a correlation exists between collision frequency and traffic volumes.

As shown in **Exhibit 5-40**, during periods when traffic is uncongested along southbound I-5, the number of reported collisions is generally proportional to prevailing traffic volumes. However, during periods of high traffic volumes and congestion, collisions increase faster than overall traffic volumes. Exhibit **5-41** shows similar results for northbound I-5. During congested periods the frequency of collisions is substantially higher than during uncongested periods. The frequency of collisions during the congested peak periods is about twice the proportion during uncongested traffic periods.

5.2.11.6 Identification of Safety Improvement Locations - Washington

The Washington State Department of Transportation uses two major programs to identify and correct potentially unsafe locations. These are the high accident location (HAL) and the high accident corridor (HAC) programs.

A HAL location is a spot location less than a mile long that has experienced a higher than average rate of severe accidents during the previous two years. Several factors are considered when determining if a location meets the HAL classification criteria. The severity of an accident, the severity per million vehicles, the roadway access category, and the accumulated severity rate per million vehicle miles are all taken into account when determining whether or not a location is a HAL.

A HAC is a section of state highway one or more miles long that has a higher than average number of severe accidents over a continuous period of time. For the five-year analysis period, the following statewide benchmark averages are calculated for each of the six roadway access categories:

- Total severity points per mile.
- Total accidents per mile.
- Severity points per accident per mile.

Information provided by WSDOT revealed that within the study area of this project, the following five locations met the HAL criteria:

- The westbound SR 14 off-ramp to southbound I-5 on-ramp.
- The southbound I-5 off-ramp to eastbound SR 14 on-ramp.
- The southbound I-5 off-ramp to Mill Plain Boulevard.
- The southbound I-5 off-ramp to Fourth Plain Boulevard.
- 39th Street between the southbound and northbound ramp terminals.

All of these locations are ramp-related which supports the conclusion drawn from the crash analysis that there are safety issues with the ramps. There were no HAC locations identified within the study area of this project.

5.2.11.7 Identification of Safety Improvement Locations - Oregon

The Oregon Department of Transportation’s Safety Priority Index System (SPIS) is the primary method for identifying high crash locations on state highways within Oregon. The SPIS score is based on three years of crash data and considers crash frequency, crash rate, and crash severity. ODOT bases its SPIS on 0.10 mile segments to account for variances in how crash locations are reported. To become a SPIS site, a location must meet one of the following criteria:

- Three or more crashes have occurred at the same location over the previous three years

- One or more fatal crashes have occurred at the same location over the previous three years

Each year, a list of the top 10 percent SPIS sites is generated and the top five percent of sites are investigated by the five Region Traffic managers' offices. These sites are evaluated and investigated for safety problems. If a correctable problem is identified, a benefit/cost analysis is performed and appropriate projects are initiated, often with funding from the Highway Safety Improvement Program.

While the general collision analysis covers the five-year period from 2002-2006, a search of the most recent ODOT SPIS database, covering the three-year period from 2006-2008, revealed seven locations (four which overlap) within the Oregon section of the project area that ranked among the highest 10 percent of SPIS sites in the state. These locations are summarized in **Exhibit 5-42**. Two of these locations are in the top five percent in the state with the other five in the top 10 percent. ODOT does not include crashes on the interchange ramps and intersections in the calculation of SPIS rates for the highway.

5.2.11.8 Vehicular Collisions Involving Trucks

On average, truck collisions occur at a slightly higher rate than general purpose traffic throughout the I-5 corridor. A summary of truck-related collisions is presented in **Exhibit 5-43**. There are differences in nomenclature for trucks in Oregon and Washington. Vehicles described as "semi tow, truck, or bobtail" in the ODOT database were counted as truck collisions. Vehicles described as "Truck Tractor, Truck Tractor & Semi-Trailer, Truck (Flatbed, Van, etc), Truck – Double Trailer Combinations, or Truck & Trailer" in the WSDOT database were counted as truck collisions. Even though nomenclature for truck collisions are different between the two states, the definitions and categorization of what constitutes a truck for the purpose of the truck collision calculation is generally the same.

Collisions involving trucks account for about 12 percent of all collisions reported on I-5 from Lombard Street to Main Street/Hwy 99, and are approximately equal to or higher than the proportion of truck volume to all traffic.

During the five-year study period in Oregon, 95 collisions involving trucks were reported. Forty-six percent occurred southbound and 54 percent occurred northbound. During the five-year study period in Washington, 160 collisions involved trucks. Seventy-two percent occurred southbound and 28 percent occurred northbound.

The rate of side-swipe collisions involving trucks is higher than any other type (39 percent). This could be attributed to the trucks attempting to change lanes in congested traffic as well as short acceleration/deceleration lanes and weaving sections in the Bridge Influence Area.

Locations with high numbers of truck-related collisions are the Columbia Boulevard ramps, Victory Boulevard ramps, Hayden Island, and the northbound exit to Marine Drive. The SR 14 westbound to I-5 southbound on-ramp, with its short turning radius, steep super-elevation, and uphill grade, likely contributes to the higher number of truck-related collisions at the bridge approach. Between 2002 and 2006, there were 13 reported collisions between I-5 mile post 0.39 and 0.30, immediately south of the SR 14 on-ramp.

5.3 Local Streets

This section summarizes existing 2005 local street performance for the peak hours of travel. Local street congestion is most intense near the I-5 ramps and is influenced by the travel direction and length of time that I-5 is congested each day.

5.3.1 Travel Demand

5.3.1.1 Vancouver Screenlines

Exhibit 5-44 displays existing 2005 conditions screenline data for the morning peak in Vancouver. Traffic in the Vancouver central city is highest near I-5. Commuters travel to the highway from neighborhoods north and east of the downtown area. Vehicular traffic heads to the Vancouver city core, from I-5 as well as the western and northern parts of Vancouver and Clark County. The west side of I-5 experiences larger volumes than the east side of the highway.

The largest northbound and southbound traffic volumes cross Fourth Plain Boulevard and Mill Plain Boulevard/15th Street, two of the major east-west thoroughfares in Vancouver. During the morning peak, volumes are highest southbound as motorists travel to the Vancouver Central Business District (CBD). Some commuters exit I-5 near Main Street and travel southbound along Vancouver arterials to avoid congestion on I-5. This diverted traffic, combined with local traffic destined for the Vancouver CBD, can overload certain north/south arterials. In general, given the trip attraction rate of the Vancouver CBD, traffic volumes are higher closer to downtown.

Exhibit 5-45 displays existing 2005 conditions screenline data for the afternoon/evening peak in Vancouver. Traffic volumes are highest for eastbound movements near I-5 as vehicles leave downtown during the afternoon/evening. The majority of vehicles exiting I-5 at Mill Plain Boulevard and Fourth Plain Boulevard contribute to the higher eastbound volumes split.

I-5 is generally not congested during the northbound afternoon/evening peak. Free flow conditions attract motorists from the Vancouver CBD who access I-5 from Mill Plain Boulevard and Fourth Plain Boulevard instead of using the north/south Vancouver arterials as in the morning peak. This contributes to a more even distribution of north and southbound volumes along Vancouver arterials during the afternoon/evening peak. Traffic volumes are highest in the heart of downtown and decrease further north as vehicles turn off arterials to access neighborhoods via local streets.

5.3.1.2 Portland Screenlines

Exhibit 5-46 displays existing 2005 conditions screenline data for the morning peak in Portland. Volumes are highest throughout the study area for westbound movements, especially east of I-5. In particular, traffic volumes across Martin Luther King Jr. Boulevard show a strong trend towards westbound movements, as commuters are traveling from eastern parts of the city towards the downtown area. Southbound travel is heavier than northbound and the north/south split widens closer to downtown Portland.

Exhibit 5-47 displays existing 2005 condition screenline data for the afternoon/evening peak in Portland. Travel across the screenlines is more balanced than the morning peak. The widest disparity between eastbound and westbound movements exists across the Interstate Avenue and Martin Luther King Jr. Boulevard screenlines. Northbound traffic is heavier than southbound. Similar to the morning peak, the disparity between northbound and southbound traffic is highest near Alberta Street, and the gap narrows farther north. As motorists leave the arterial network to access neighborhood streets, northbound volumes drop, leading to an almost even split of arterial traffic near the Columbia Slough.

5.3.2 Intersection Operational Performance

5.3.2.1 Vancouver – Morning and Afternoon/Evening Peak Hours

5.3.2.2 SR 14/City Center Interchange Area Operational Performance

The SR 14/City Center interchange area consists of 33 study intersections, bound by the following area as shown in **Exhibit 5-48**:

- The Columbia River to the south;
- 11th Street to the north;
- Esther Street to the west; and
- I-5 to the east.

During the morning and afternoon/evening peak hours, all 33 intersections perform at acceptable service levels and meet the City of Vancouver's standard of LOS E for downtown intersections. **Exhibits 5-49** and **5-50** list the intersection operations of all 33 intersections during the morning and afternoon/evening peak hours.

During the morning peak hour, several intersections experience traffic that backs up into upstream intersections. At the entrance to the I-5 southbound and SR 14 westbound on-ramps at Fifth Street and Washington Street, queues extend north on Washington Street. Main Street and Evergreen Boulevard experience queuing during both the morning and afternoon/evening peaks which result in vehicular queues extending into upstream intersections. The list of intersections with queues that exceed storage or backup into upstream intersections can be seen in **Exhibit 5-49** and **Exhibit 5-50**.

5.3.2.3 Mill Plain Boulevard Interchange Area Operational Performance

The Mill Plain Boulevard interchange area consists of the following 16 study intersections as shown in **Exhibit 5-51**:

- Mill Plain Boulevard at Columbia Street (Vancouver);
- Mill Plain Boulevard at Washington Street (Vancouver);
- Mill Plain Boulevard at Main Street (Vancouver);

- Mill Plain Boulevard at Broadway (Vancouver);
- Mill Plain Boulevard at C Street (Vancouver);
- Mill Plain Boulevard at I-5 southbound on- and off-ramps (WSDOT);
- Mill Plain Boulevard at I-5 northbound on- and off-ramps (WSDOT);
- 15th Street at Columbia Street (Vancouver);
- 15th Street at Washington Street (Vancouver);
- 15th Street at Main Street (Vancouver);
- 15th Street at Broadway (Vancouver);
- 15th Street at C Street (Vancouver);
- McLoughlin Boulevard at Columbia Street (Vancouver);
- McLoughlin Boulevard at Main Street (Vancouver);
- McLoughlin Boulevard at Broadway (Vancouver); and
- McLoughlin Boulevard at Fort Vancouver Way (Vancouver).

During the morning and afternoon/evening peak hours, all 16 intersections meet the City of Vancouver's LOS standard and perform acceptably. **Exhibit 5-49** and **Exhibit 5-50** list the intersection operations of all 16 intersections during the morning and afternoon/evening peak hours.

During the morning peak hour, the intersection of Mill Plain Boulevard at Main Street often experiences vehicular queues that extend beyond its southbound left-turn lane, resulting in blockage of some upstream intersections. In addition, I-5 highway congestion backs into the southbound ramp terminal at Mill Plain Boulevard. As a result, this intersection experiences vehicular queues that extend beyond its eastbound right-turn and westbound left-turn pockets.

During the afternoon/evening peak hour, the Mill Plain diamond interchange experiences eastbound vehicular queuing at the northbound ramp terminal which extends west through the southbound ramp terminal. The queuing results from the significant traffic volume which originates from the downtown area and travels north to access I-5 at Mill Plain Boulevard. The intersection of 15th Street and Broadway experiences vehicular queues that extend beyond its westbound left lane, resulting in blockage of some westbound through movements.

5.3.2.4 Fourth Plain Boulevard Interchange Area Operational Performance

The Fourth Plain Boulevard interchange area consists of the following 14 study intersections as shown in **Exhibit 5-52**:

- 24th Street at Columbia Street (Vancouver);
- 24th Street at Main Street (Vancouver);
- Fourth Plain Boulevard at Columbia Street (Vancouver);

- Fourth Plain Boulevard at Main Street (Vancouver);
- Fourth Plain Boulevard at Broadway (Vancouver);
- Fourth Plain Boulevard at F Street (Vancouver);
- Fourth Plain Boulevard at I-5 southbound on- and off-ramps (WSDOT);
- Fourth Plain Boulevard at I-5 northbound on- and off-ramps (WSDOT);
- Fourth Plain Boulevard at Post Cemetery (Vancouver);
- Fourth Plain Boulevard at St. Johns Boulevard (Vancouver);
- 28th Street at Main Street (Vancouver);
- 28th Street at Broadway (Vancouver);
- 29th Street at Main Street/Broadway (Vancouver); and
- 33rd Street at Main Street (Vancouver).

During the morning and afternoon/evening peak hours, all but one of the 14 intersections perform at acceptable service levels and meet Vancouver's standard of LOS D for signalized or LOS E for unsignalized intersections. The intersection of 28th Street at Main Street does not meet the LOS standard during the morning peak hour and performs at LOS F on the stop-controlled approach of 28th Street. During the afternoon/evening peak hour, the intersection of 28th Street at Main Street performs acceptably. **Exhibits 5-49** and **5-50** list the operations of all 14 intersections during the morning and afternoon/evening peak hours.

Fourth Plain Boulevard at Main Street experiences westbound vehicular queuing that extends through the intersection with F Street in the morning peak hour. Southbound traffic in the morning peak also experiences queues that extend into upstream intersections.

During the afternoon/evening peak hour, queuing in the vicinity of the Fourth Plain Boulevard interchange area is often substantial for both northbound and westbound traffic, resulting in some intersection blockage. The intersection of 33rd Street at Main Street often experiences vehicular queues that extend beyond its eastbound and westbound left-turn lanes, resulting in blockage of some through movements.

5.3.2.5 SR 500/Main Street/39th Street Interchange Area Operational Performance

The SR 500/Main Street/39th Street interchange area consists of the following 10 study intersections as shown in **Exhibit 5-53**:

- 39th Street at Main Street (Vancouver);
- 39th Street at F Street (Vancouver);
- 39th Street at H Street (Vancouver);
- 39th Street at I-5 southbound on- and off-ramps (WSDOT);
- 39th Street at I-5 northbound on- and off-ramps (WSDOT);

- WSDOT/40th Street at Main Street (Vancouver);
- 45th Street at Main Street (Vancouver);
- Hazel Dell at Main Street (Vancouver);
- Ross Street at Main Street (Clark County); and
- Ross Street at North Road (Clark County).

During the morning and afternoon/evening peak hours, nine of the 10 study area intersections perform at acceptable service levels. The intersection of 39th Street at the I-5 southbound ramp terminal does not meet Vancouver's unsignalized LOS E standard during the morning peak hour. During the afternoon/evening peak hour, the intersection of 39th Street at F Street does not meet the unsignalized LOS E standard. **Exhibit 5-49** and **Exhibit 5-50** list the operations of all 10 intersections during the morning and afternoon/evening peak hours.

During the morning peak hour, vehicles near the 39th Street interchange experience queues that extend beyond the left-turn lanes on all approaches at Main Street. The westbound vehicular queues extend into the intersection of 39th Street at F Street. The intersection of 39th Street at the I-5 ramp terminal often experiences vehicular queues on the northbound approach, resulting in queues of approximately 600 feet.

During the afternoon/evening peak hour, vehicles near the 39th Street at Main Street often experience queues that extend beyond the left-turn lanes on all approaches. The westbound vehicular queues extend into the intersection of 39th Street at H Street. The intersection of 39th Street at the I-5 northbound and southbound ramp terminals often experiences vehicular queues on the northbound approaches.

5.3.2.6 Portland – Morning and Afternoon/Evening Peak Hours

5.3.2.7 Hayden Island Interchange Area Operational Performance

The Hayden Island interchange area consists of the following two study intersections as shown in **Exhibit 5-54**:

- Center Avenue and I-5 southbound on- and off-ramps (ODOT); and
- Hayden Island Drive and Hayden Island Drive South (ODOT, closest signalized intersection to northbound on- and off-ramps).

During the morning and afternoon/evening peak hours, Center Avenue and the I-5 southbound ramp terminal perform at an acceptable service level and meet ODOT's 0.85 V/C ratio standard. During morning and afternoon/evening peak hours, Hayden Island Drive and Hayden Island Drive South perform at an acceptable service level and meet ODOT's 0.85 V/C ratio standard. **Exhibits 5-55** and **5-56** list the operations of both intersections during the morning and afternoon/evening peak hours.

During the afternoon/evening peak hour, the westbound left turn at the southbound ramp terminal often experiences vehicular queues that extend beyond its left-turn pocket, resulting in queuing that sometimes extends into the deceleration area of the highway off-ramp.

5.3.2.8 Marine Drive Interchange Area Operational Performance

The Marine Drive interchange area consists of the following three study intersections as shown in **Exhibit 5-57**:

- Union Court and I-5 northbound off-ramp (ODOT);
- Marine Drive and I-5 on- and off-ramps (ODOT); and
- Union Court/Marine Way and Vancouver Way (Portland).

During the morning peak hour, all three of the intersections perform at acceptable service levels and meet ODOT's 0.85 V/C ratio standard or Portland's unsignalized intersection standard of LOS E. Afternoon/evening highway congestion from I-5 northbound causes increased delay during the afternoon/evening peak hour along Marine Drive on both the east side and west side of the interchange. However, all intersections perform at acceptable service levels. **Exhibit 5-55** lists the intersection operations of the three intersections during the morning peak hour.

During the afternoon/evening peak hour, the I-5 northbound ramp meter affects the Marine Drive ramp terminal and the Union Court at Vancouver Way intersection. The on-ramp queue extends past the ramp and then east across the highway overpass. As a result, several left- and right-turn lanes at these three locations experience queues that are longer than the available storage lengths and extend through upstream intersections. However, all intersections operate at an acceptable service level. **Exhibit 5-56** lists the intersection operations of the three intersections during the afternoon/evening peak hour.

5.3.2.9 Victory Boulevard Interchange Area Operational Performance

The Victory Boulevard interchange area consists of the following four study intersections as shown in **Exhibit 5-58**:

- Interstate Avenue at Argyle Street (Portland);
- Victory Boulevard at Expo Road (Portland) ;
- Victory Boulevard at southbound on-ramp (ODOT); and
- Victory Boulevard at northbound on-ramp (ODOT).

During the morning and afternoon/evening peak hours, all four of the intersections operate at acceptable service levels and meet ODOT's 0.85 V/C ratio standard or Portland's intersection standard of LOS D or E. **Exhibits 5-55** and **5-56** lists the intersection operations of the four intersections during the morning and afternoon/evening peak hours.

During the afternoon/evening peak hour, the Victory Boulevard northbound ramp terminals experience vehicular queues caused by northbound highway congestion on I-5, resulting in blockage of some eastbound left-turning vehicles at the intersection.

However, the intersection operates at an acceptable LOS. The list of intersections with queues that exceed storage or backup into upstream intersections can be seen in **Exhibits 5-55** and **5-56**.

5.3.2.10 Interstate Avenue Analysis Area Operational Performance

The Interstate Avenue analysis area consists of the following four study intersections as shown in **Exhibit 5-59**:

- Going Street at Interstate Avenue (Portland);
- Alberta Street at Interstate Avenue (Portland);
- Rosa Parks Way at Interstate Avenue (Portland); and
- Lombard Street at Interstate Avenue (ODOT).

During the morning and afternoon/evening peak hours, all four of the intersections operate at acceptable service levels and meet either Portland's standard of LOS D or ODOT's 0.99 V/C ratio standard. **Exhibits 5-55** and **5-56** list the intersection operations of the four intersections during the morning and afternoon/evening peak hours.

The lists of intersections with queues that exceed storage or backup into upstream intersections are also shown in **Exhibits 5-55** and **5-56**. Going Street often experiences vehicular queues that extend beyond its westbound and northbound left-turn pockets. Alberta Street often experiences vehicular queues that extend beyond its southbound and northbound left-turn pockets. Rosa Parks Way experiences vehicular queues that extend beyond its westbound and northbound left-turn pockets. Lombard Street also experiences vehicular queues that extend beyond its westbound and northbound left-turn pockets.

5.3.2.11 Martin Luther King Jr. Boulevard Analysis Area Operational Performance

The Martin Luther King Jr. Boulevard analysis area consists of the following five study intersections as shown in **Exhibit 5-59**:

- Fremont Street at Martin Luther King Jr. Boulevard (Portland);
- Alberta Street at Martin Luther King Jr. Boulevard (Portland);
- Rosa Parks Way at Martin Luther King Jr. Boulevard (Portland);
- Lombard Street at Martin Luther King Jr. Boulevard (ODOT); and
- Columbia Boulevard at Martin Luther King Jr. Boulevard (ODOT).

During the morning and afternoon/evening peak hours, all intersections perform at acceptable service levels and meet either Portland's standard of LOS D or ODOT's 0.99 V/C ratio standard. **Exhibits 5-55** and **5-56** list the intersection operations of the five intersections during the morning and afternoon/evening peak hours.

Exhibits 5-55 and **5-56** list intersections with queues that exceed storage or backup into upstream intersections. Fremont Street often experiences vehicular queues that extend beyond its left-turn pockets on all approaches. Alberta Street experiences queues that extend beyond its left-turn pockets on all approaches except for the eastbound approach.

Rosa Parks Way experiences vehicular queues that extend beyond its northbound left-turn pocket. Lombard Street sees vehicular queues that extend beyond its left-turn pockets on all approaches. Columbia Boulevard experiences vehicular queues that extend beyond its left-turn pockets on all approaches except for the eastbound approach.

5.3.2.12 I-5 Ramp Terminals Analysis Area Operational Performance

The I-5 Ramp Terminals analysis area consists of the following seven study intersections as shown in **Exhibit 5-59**:

- Alberta Street at the I-5 southbound ramp terminal (ODOT);
- Alberta Street at the I-5 northbound ramp terminal (ODOT);
- Rosa Parks Way at the I-5 southbound ramp terminal (ODOT);
- Rosa Parks Way at the I-5 northbound ramp terminal (ODOT);
- Lombard Street at the I-5 southbound ramp terminal (ODOT);
- Lombard Street at the I-5 northbound ramp terminal (ODOT); and
- Columbia Boulevard at I-5 ramp terminal (ODOT).

During morning and afternoon/evening peak hours, all intersections perform at acceptable service levels and meet ODOT's 0.85 V/C ratio standard. **Exhibits 5-55** and **5-56** list the operations of the five intersections during the morning and afternoon/evening peak hours.

Exhibits 5-55 and **5-56** list intersections with queues that exceed storage or backup into upstream intersections. At the Alberta Street southbound ramp terminal, westbound traffic queues extend through the northbound ramp terminal during the morning peak. At the Rosa Parks Way southbound ramp terminal during the morning peak hour, westbound left-turning vehicular queues exceed the available storage. For both peaks, westbound right-turning vehicular queues exceed the available storage at the Columbia Boulevard and I-5 ramp terminal.

5.4 Pedestrian and Bicycle Circulation

5.4.1 Existing Circulation System

Pedestrians and bicyclists experience challenging conditions when crossing the Columbia River on the I-5 bridges. The width of the shared-use pedestrian and bicycle facility on the I-5 bridge is non-standard (generally no wider than four feet) and separated from traffic by low non-standard barriers (in Washington and Oregon, engineering standards state that shared-use paths should be a minimum of 14 feet wide). The mixing of pedestrians and bicycles in this narrow facility can cause safety problems. Pedestrians and bicyclists are exposed to high noise levels, exhaust, and debris. The grades on the bridge create high downhill speeds for bicyclists and difficult uphill climbs for some pedestrians and bicyclists.

There exist direct pedestrian and bicycle connections to the Marine Drive area on the east and west sides of I-5. In Vancouver, direct connections provide access to the downtown Vancouver area; however, pedestrian and bicycle connections between Vancouver, Hayden Island, and Marine Drive are circuitous and require users to navigate local street intersections. For example, no connection exists for pedestrians or bicyclists wanting to stay on the west side of the bridge between Hayden Island and Marine Drive.

On the south side of the Columbia River, connections to the large Portland bikeway network exist via Marine Drive to the west and east, Martin Luther King Jr. Boulevard to the southeast and Expo Road to the south. Directional way-finding signing can be confusing or non-existent in some places. Furthermore, the paths connecting the crossing to the larger bikeway network are narrow and place bicyclists close to high-speed traffic, which includes a high percentage of heavy vehicles.

Exhibit 5-60 illustrates existing and planned multi-use trails and bicycle lanes in the vicinity of the Interstate Bridge.

5.4.2 Travel Demand

Pedestrian and bicycle volumes across the Columbia River were measured by conducting counts at four locations on September 11, 2007: (1) shared-use pathway entrance to the I-205 Glenn Jackson Bridge near Northeast Airport Way in Portland, (2) the east pathway to the I-5 bridgehead on the Oregon side of the Columbia River, (3) the west pathway to the I-5 bridgehead on the Oregon side of the Columbia River, and (4) the shared-use pathway on the east side of the North Portland Harbor Bridge.

Exhibit 5-61 displays the river crossing results by direction of travel, time of day and by mode. A combined total of 566 pedestrian and bicycle trips were logged during the 14-hour period at the three river crossing locations. **Exhibit 5-62** shows that there were a total of 198 pedestrian and bicycle trips over the I-205 Glenn Jackson Bridge, or approximately 35 percent of the total river crossings. The remaining 368 trips used the two pathways on the I-5 Interstate Bridge. As seen in **Exhibit 5-63**, 237 (64 percent) traveled across the Interstate Bridge on the wider, west-side pathway. **Exhibit 5-64** shows the remaining 131 trips that made use of the east side pathway. It is noted that the data was collected during the Portland-Vancouver area’s Bike Commute Challenge, an annual month-long local contest that promotes bicycle usage. Average daily traffic conditions are likely to be less than the volumes observed during the count day.

Pedestrian and bicycle trip activity is similar to vehicular traffic in that travel over the bridge is heavier in the southbound direction during the morning and in the northbound direction during the afternoon/evening. The morning peak hour for pedestrian and bicycle travel occurs between 7 and 8 a.m. The afternoon/evening peak period occurs between 5 and 7 p.m. There does not appear to be a midday peak.

Of the non-motorized modes, bicyclists far outnumber pedestrians, accounting for 492 out of 566 (87 percent) of the total trips as shown in **Exhibit 5-61**. A total of 188 bicycle trips were made on the I-205 Glenn Jackson Bridge as seen in **Exhibit 5-62**, or 38 percent of the total bicycle river crossings. Ten pedestrian trips, or 14 percent of the overall total pedestrian crossings, were made on the I-205 crossing as seen in **Exhibit 5-62**. For the I-5 Interstate Bridge, 65 percent of bicycle trips and 61 percent of pedestrian trips were conducted on the west-side pathway. For the 14-hour period, there were 21 percent more pedestrian and bicycle trips northbound than in the southbound direction.

5.4.3 Existing Issues

Exhibit 5-65 highlights and lists several existing pedestrian and bicycle issues related to pedestrian and bicycle circulation in the vicinity of the Interstate Bridge. Many of the concerns are related to non-standard facilities: narrow pathways, low traffic barriers, low clearances and steep grades. Pedestrians and bicyclists must travel close to vehicular traffic, where they are exposed to noise, exhaust and debris. Directional signage can be confusing or non-existent in some places.

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Exhibit 5-1

Vancouver Analysis Intersections			
#	**Intersection**	**#**	**Intersection**
01	3rd/4th St. and Columbia St	38	Mill Plain Blvd. and C St.
02	4th St. and Columbia St.	39	Mill Plain Blvd. and I-5 SB On-/Off-Ramps
03	4th St. and Washington St.	40	Mill Plain Blvd. and I-5 NB On-/Off-Ramps
04	5th St. and Columbia St.	41	15th St. and Columbia St.
05	5th St. and Washington St.	42	15th St. and Washington St.
06	6th St. and Columbia St.	43	15th St. and Main St.
07	6th St. and Washington St.	44	15th St. and Broadway
08	6th St. and Main St.	45	15th St. and C St.
09	6th St. and Broadway	46	McLoughlin Blvd. and Columbia St.
10	6th St. and C St.	47	McLoughlin Blvd. and Main St.
11	8th St. and Esther St.	48	McLoughlin Blvd. and Broadway
12	8th St. and Columbia St.	49	McLoughlin Blvd. and Fort Vancouver Way
13	8th St. and Washington St.	50	24th St. and Columbia St.
14	8th St. and Main St.	51	24th St. and Main St.
15	8th St. and Broadway	52	4th Plain Blvd. and Columbia St.
16	8th St. and C St.	53	4th Plain Blvd. and Main St.
17	9th St. and Esther St.	54	4th Plain Blvd. and Broadway
18	9th St. and Columbia St.	55	4th Plain Blvd. and F St.
19	9th St. and Washington St.	56	4th Plain Blvd. and I-5 SB On-/Off-Ramps
20	9th St. and Main St.	57	4th Plain Blvd. and I-5 NB On-/Off-Ramps
21	9th St. and Broadway	58	4th Plain Blvd. and Post Cemetery
22	Evergreen Blvd. and Esther St.	59	4th Plain Blvd. and St. Johns Blvd.
23	Evergreen Blvd. and Columbia St.	60	28th St. and Main St.
24	Evergreen Blvd. and Washington St.	61	28th St. and Broadway
25	Evergreen Blvd. and Main St.	62	29th St. and Main St./Broadway
26	Evergreen Blvd. and Broadway	63	33rd St. and Main St.
27	Evergreen Blvd. and C St.	64	39th St. and Main St.
28	11th St. and Esther St.	65	39th St. and F St.
29	11th St. and Columbia St.	66	39th St. and H St.
30	11th St. and Washington St.	67	39th St. and I-5 SB On-/Off-Ramps
31	11th St. and Main St.	68	39th St. and I-5 NB On-/Off-Ramps
32	11th St. and Broadway	69	WSDOT/40th St. and Main St.
33	11th St. and C St.	70	45th St. and Main St.
34	Mill Plain Blvd. and Columbia St.	71	Hazel Dell and Main St. (West)
35	Mill Plain Blvd. and Washington St.	72	Ross St. and Main St.
36	Mill Plain Blvd. and Main St.	73	Ross St. and North Rd.
37	Mill Plain Blvd. and Broadway		

Exhibit 5-2

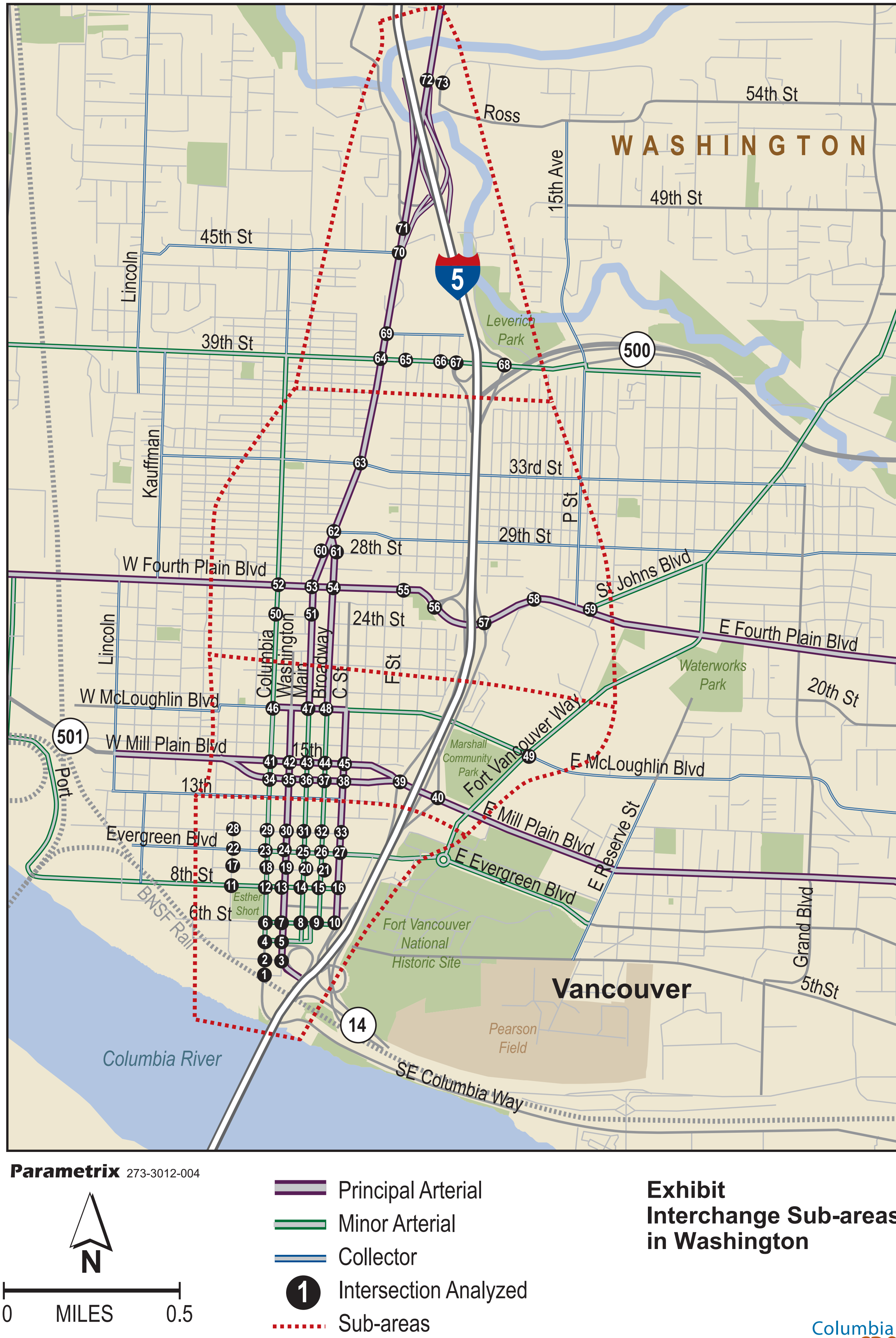


Exhibit
Interchange Sub-areas in Washington

Columbia River CROSSING

Exhibit 5-3

Portland Analysis Intersections	
#	Intersection
01	Fremont and MLK Jr.
02	Going and Interstate
03	Alberta and Interstate
04	Alberta and SB I-5 Off-Ramp
05	Alberta and NB I-5 Off-Ramp
06	Alberta and MLK Jr.
07	Portland and Interstate
08	Portland and I-5 SB On-/Off Ramps
09	Portland and I-5 NB On-/Off Ramps
10	Portland and MLK Jr.
11	Lombard and Interstate
12	Lombard and I-5 SB On-Ramps
13	Lombard and I-5 NB Off-Ramps
14	Lombard and MLK Jr.
15	Interstate and Argyle
16	Columbia Blvd and I-5 Ramps
17	Columbia Blvd and MLK Jr.
18	Victory and Expo Road
19	Victory Blvd and I-5 SB On-Ramp
20	Victory Blvd and NB On-/Off-Ramps
21	Union Ct and I-5 NB Off-Ramp
22	Union Ct/Marine Way and Vancouver Way
23	Marine Dr and I-5 On-/Off-Ramps
24	Center Ave and I-5 SB On-/Off Ramps
25	Hayden Island Dr and Hayden Island Dr South

Exhibit 5-4

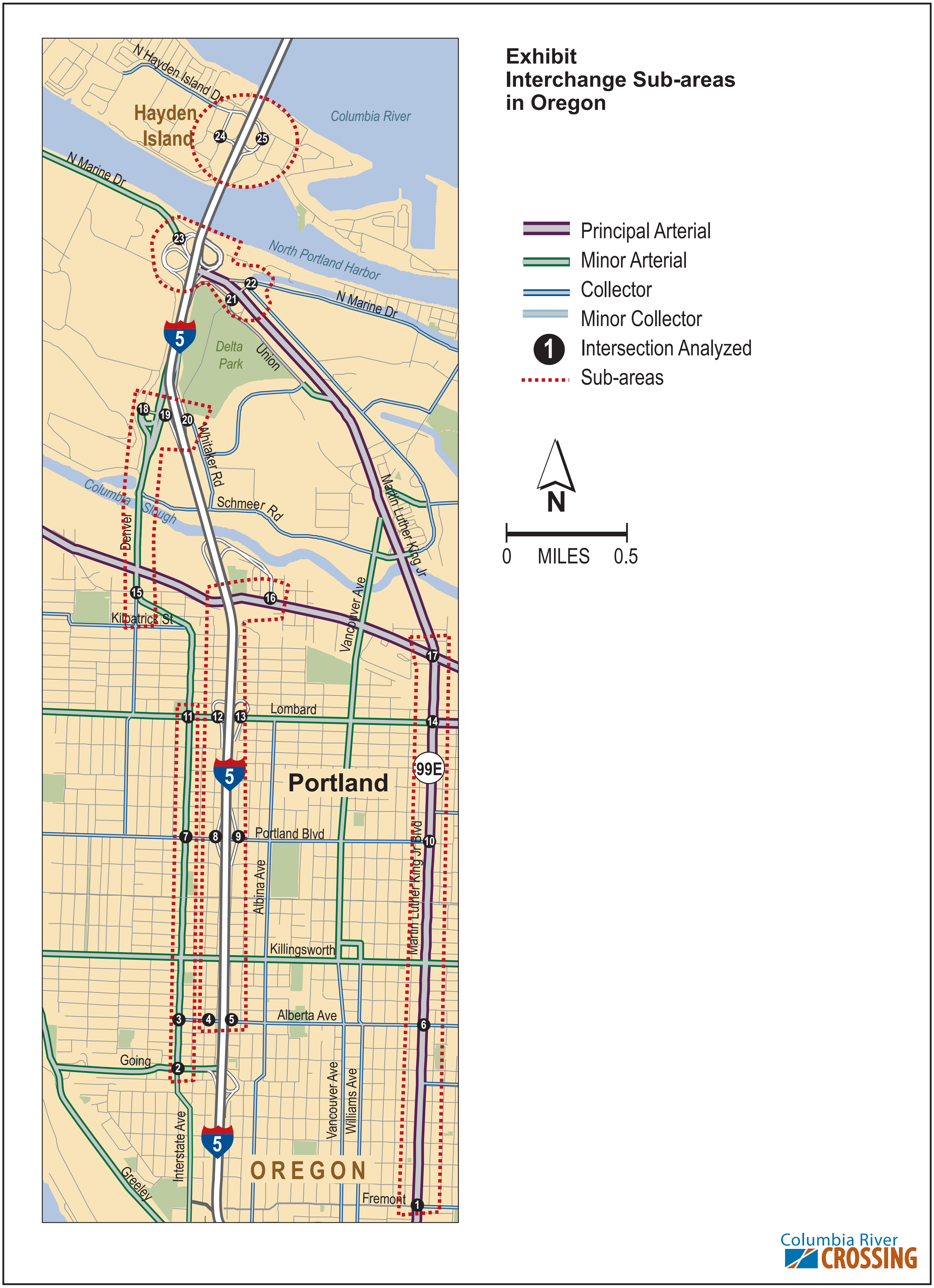


Exhibit
Interchange Sub-areas
in Oregon
Principal Arterial
Minor Arterial
Collector
Minor Collector
Intersection Analyzed
Sub-areas
N
0 MILES 0.5
N Hayden Island Dr
Hayden Island
Columbia River
N Marine Dr
North Portland Harbor
N Marine Dr
Delta Park
Union
Whitaker Rd
Schmeer Rd
Columbia Slough
Denver
Martin Luther King Jr
Vancouver Ave
Kilpatrick St
Lombard
Portland
99E
Portland Blvd
Albina Ave
Martin Luther King Jr Blvd
Killingsworth
Alberta Ave
Going
Interstate Ave
Vancouver Ave
Williams Ave
Greeley
OREGON
Fremont
Columbia River CROSSING

Exhibit 5-5

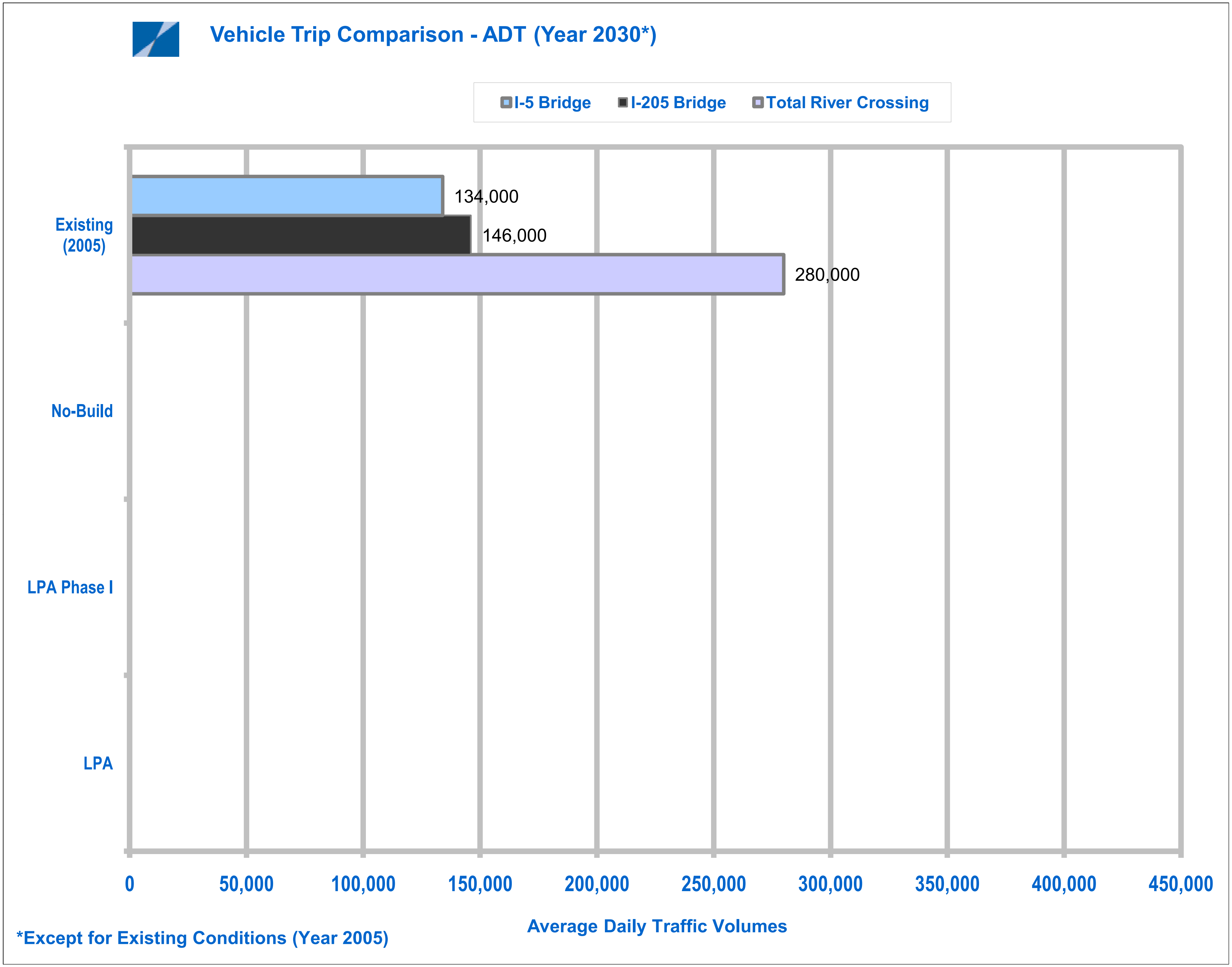

Vehicle Trip Comparison - ADT (Year 2030*)
I-5 Bridge
I-205 Bridge
Total River Crossing
Existing (2005)
No-Build
LPA Phase I
LPA
134,000
146,000
280,000
0
50,000
100,000
150,000
200,000
250,000
300,000
350,000
400,000
450,000
Average Daily Traffic Volumes
*Except for Existing Conditions (Year 2005)

Exhibit 5-6

Southbound Vehicle Trips within BIA (2005)

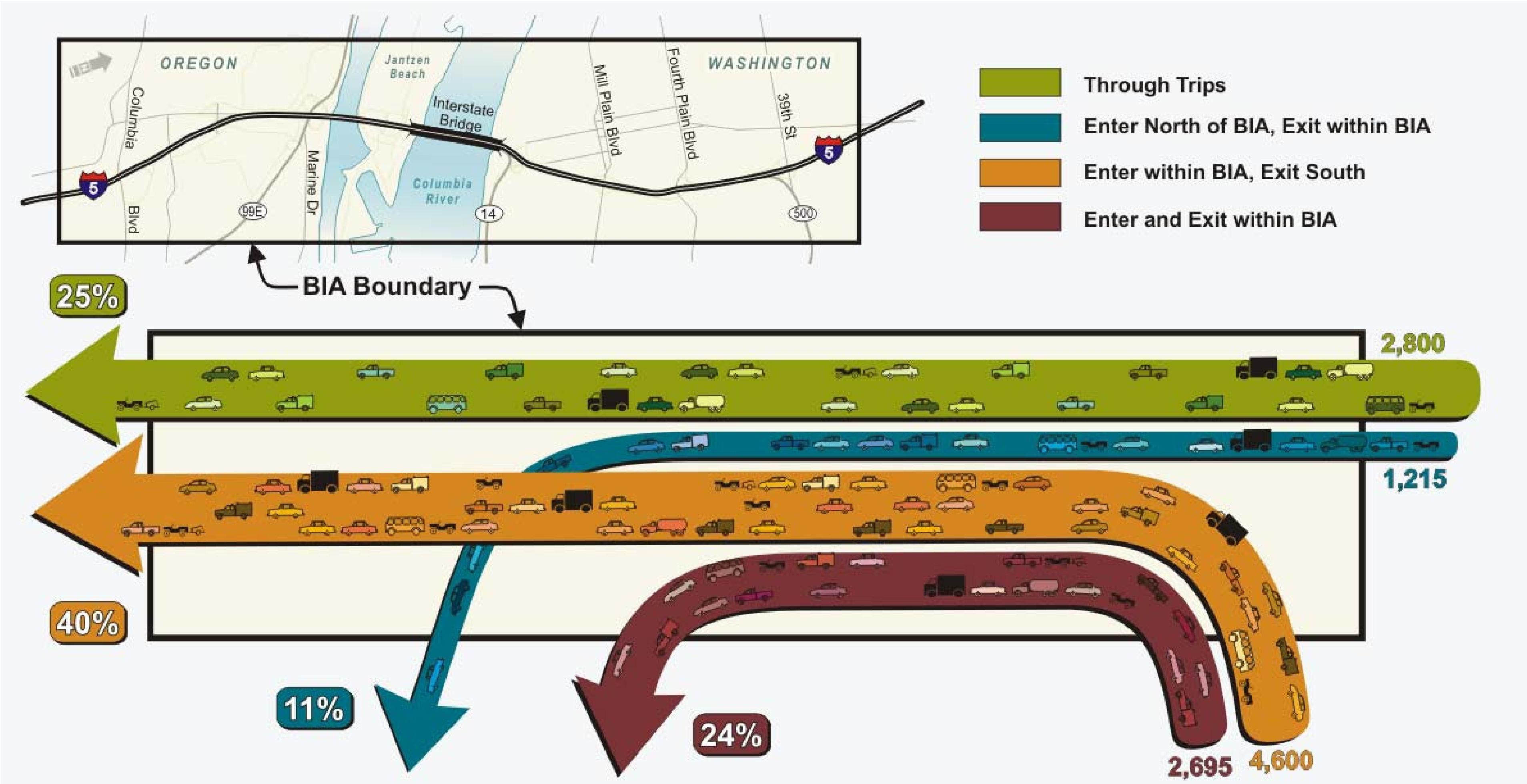


Exhibit 5-7

Northbound Vehicle Trips within BIA (2005)

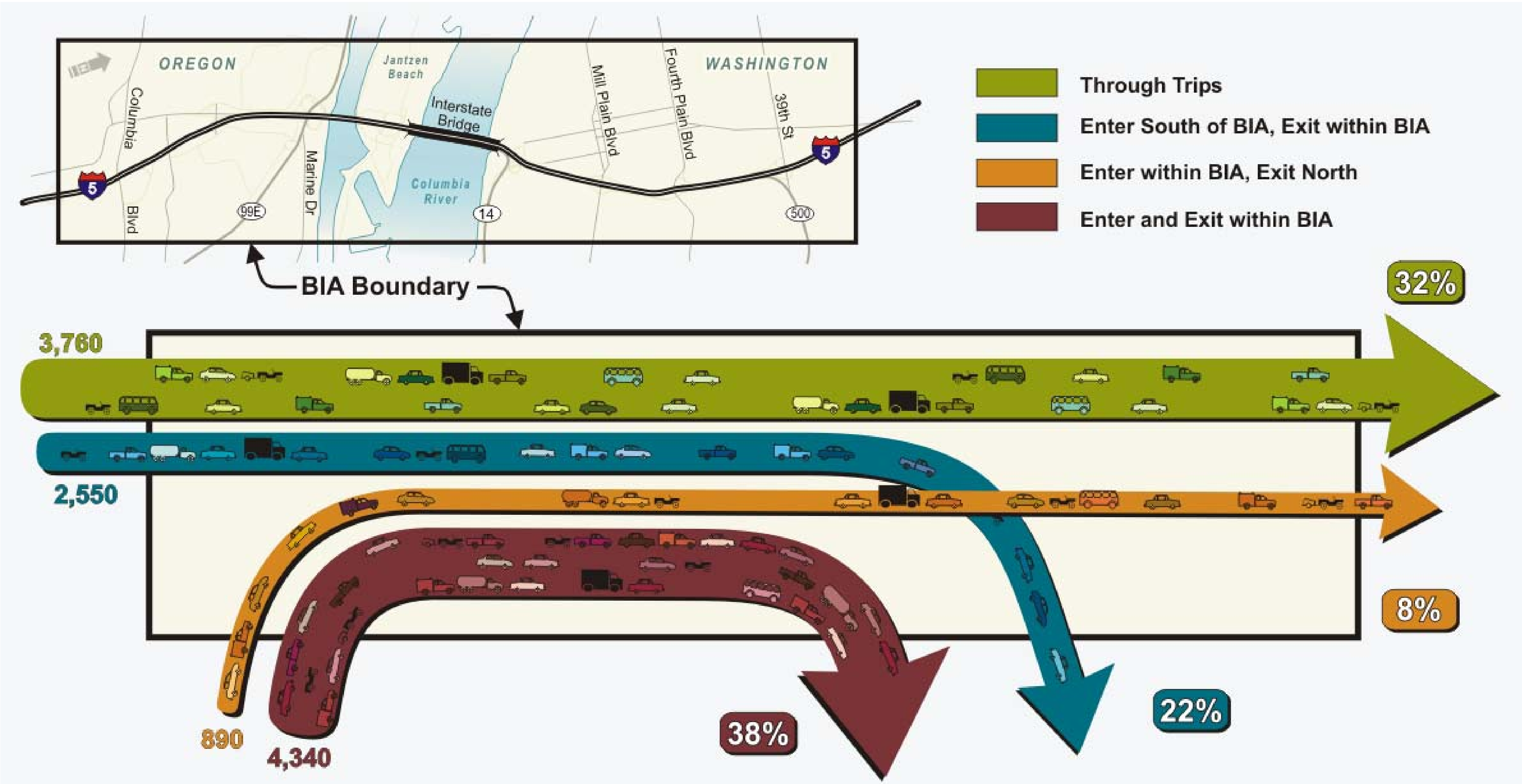
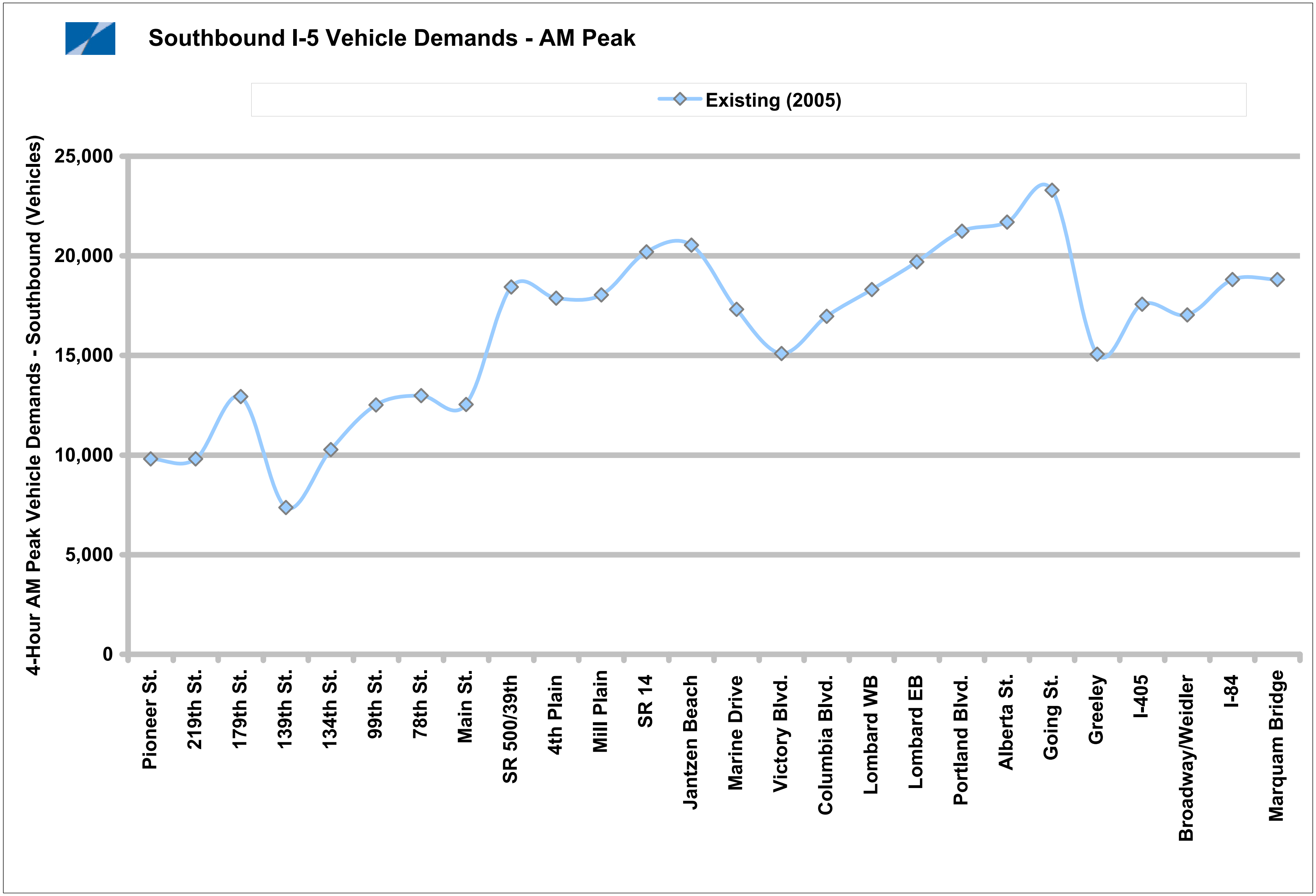


Exhibit 5-8



Southbound I-5 Vehicle Demands - AM Peak
Existing (2005)
4-Hour AM Peak Vehicle Demands - Southbound (Vehicles)
25,000
20,000
15,000
10,000
5,000
0
Pioneer St.
219th St.
179th St.
139th St.
134th St.
99th St.
78th St.
Main St.
SR 500/39th
4th Plain
Mill Plain
SR 14
Jantzen Beach
Marine Drive
Victory Blvd.
Columbia Blvd.
Lombard WB
Lombard EB
Portland Blvd.
Alberta St.
Going St.
Greeley
I-405
Broadway/Weidler
I-84
Marquam Bridge

Exhibit 5-9

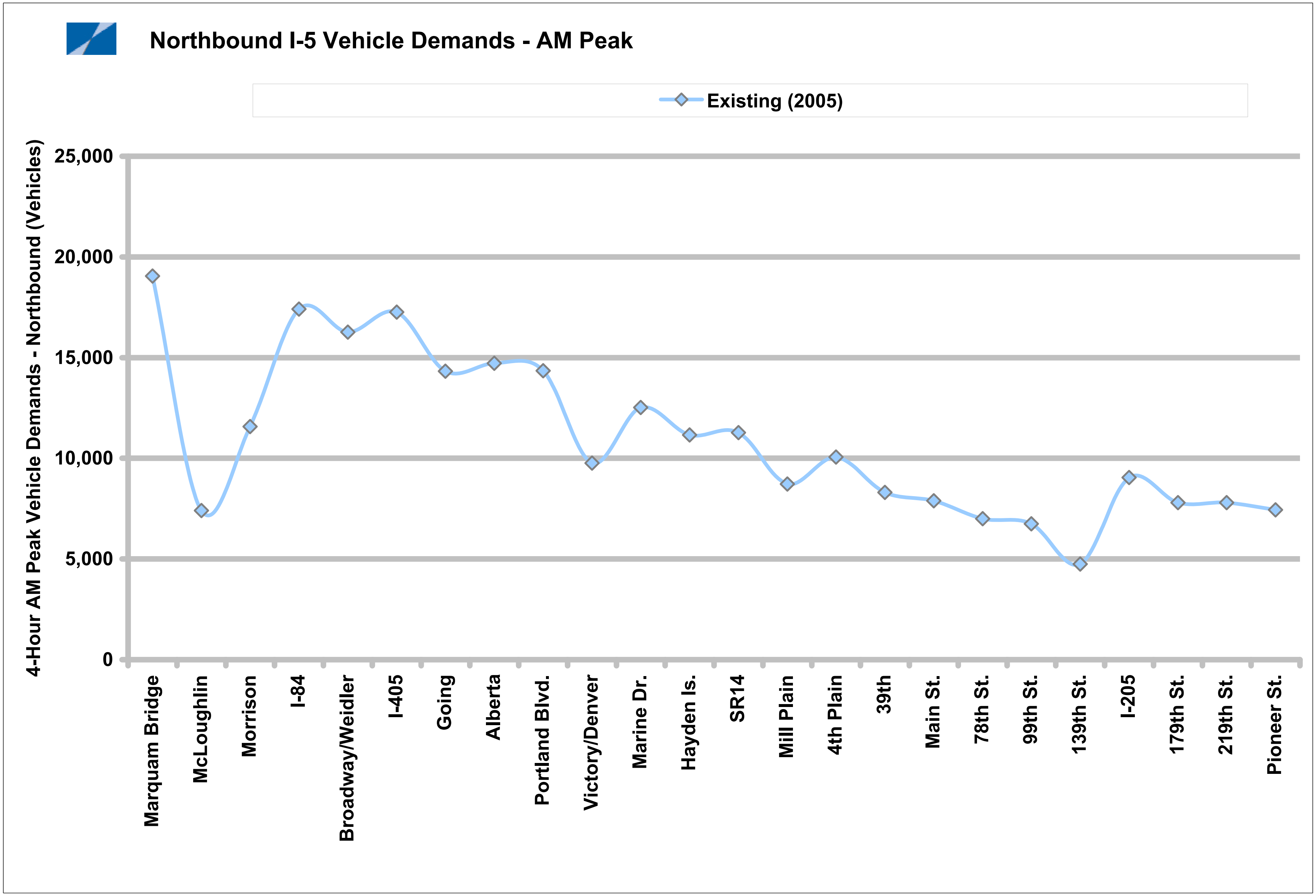
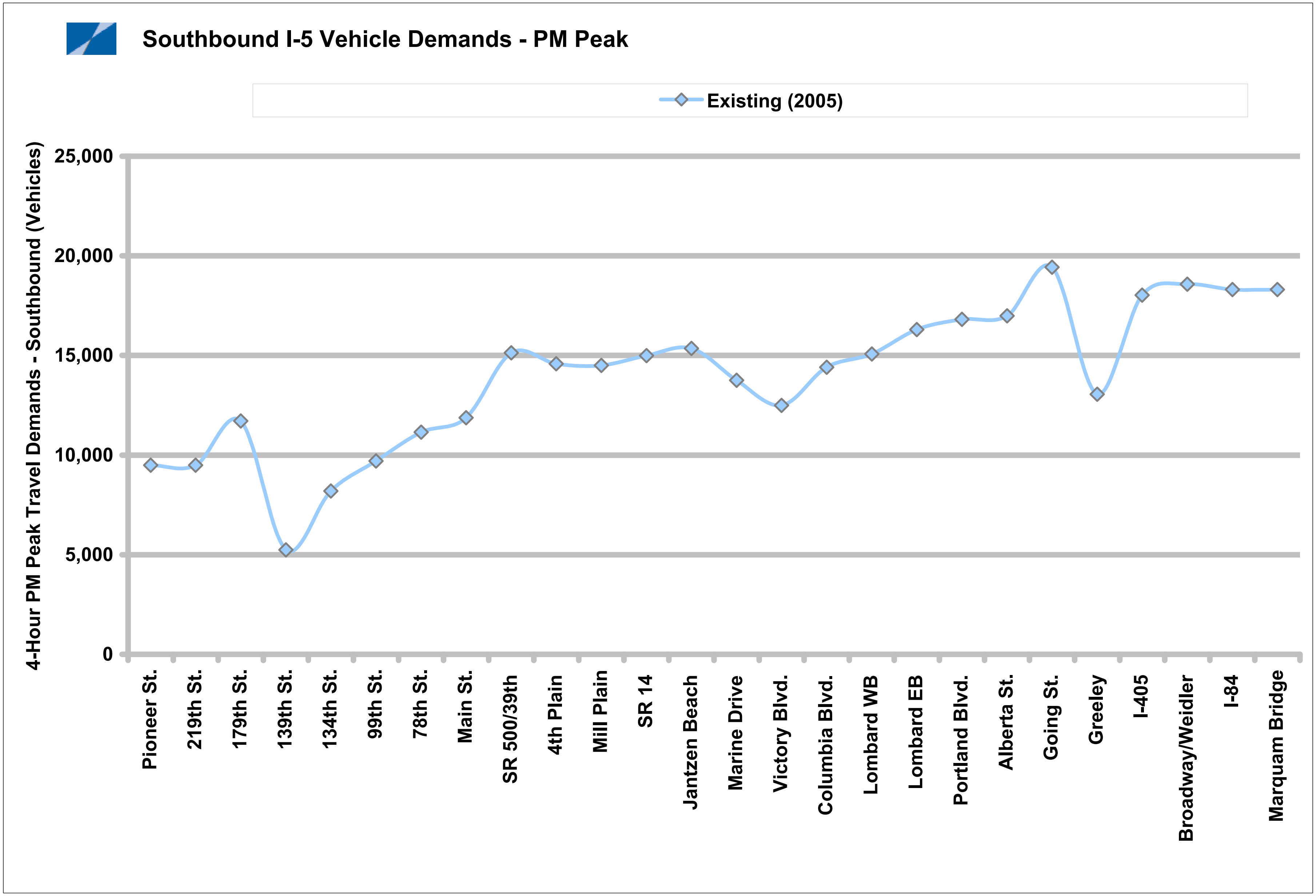
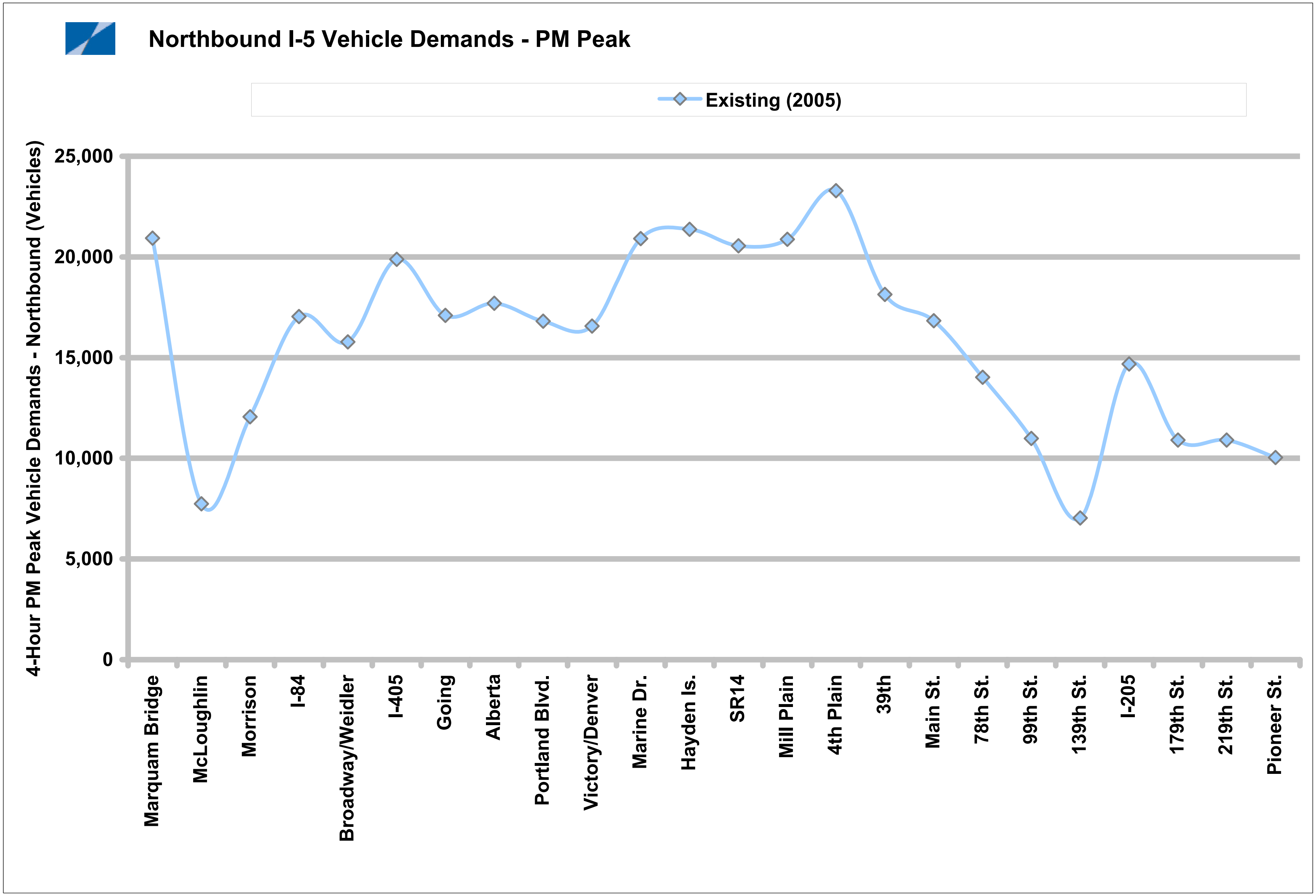

Northbound I-5 Vehicle Demands - AM Peak
Existing (2005)
4-Hour AM Peak Vehicle Demands - Northbound (Vehicles)
25,000
20,000
15,000
10,000
5,000
0
Marquam Bridge
McLoughlin
Morrison
I-84
Broadway/Weidler
I-405
Going
Alberta
Portland Blvd.
Victory/Denver
Marine Dr.
Hayden Is.
SR14
Mill Plain
4th Plain
39th
Main St.
78th St.
99th St.
139th St.
I-205
179th St.
219th St.
Pioneer St.

Exhibit 5-10



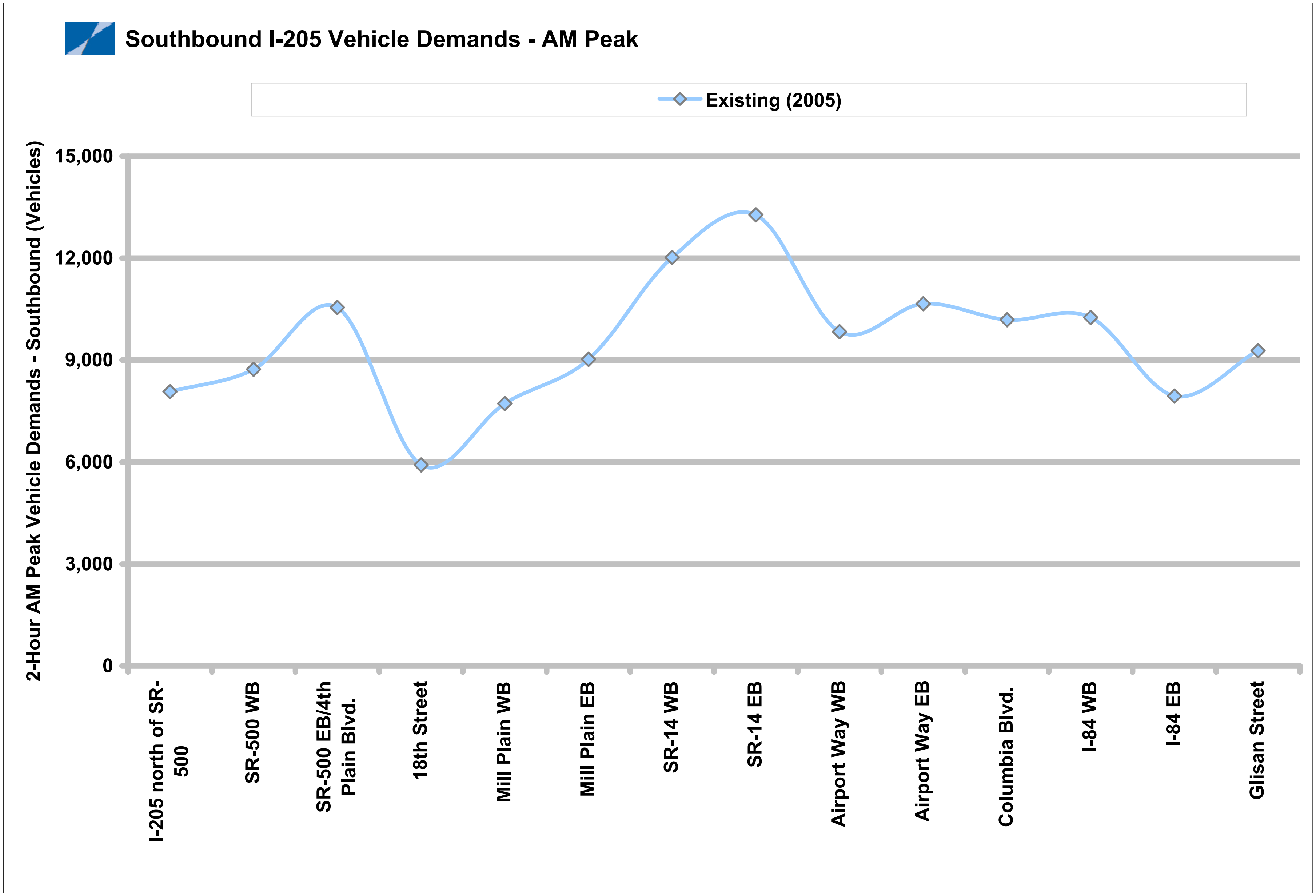
Southbound I-5 Vehicle Demands - PM Peak
Existing (2005)
4-Hour PM Peak Travel Demands - Southbound (Vehicles)
25,000
20,000
15,000
10,000
5,000
0
Pioneer St.
219th St.
179th St.
139th St.
134th St.
99th St.
78th St.
Main St.
SR 500/39th
4th Plain
Mill Plain
SR 14
Jantzen Beach
Marine Drive
Victory Blvd.
Columbia Blvd.
Lombard WB
Lombard EB
Portland Blvd.
Alberta St.
Going St.
Greeley
I-405
Broadway/Weidler
I-84
Marquam Bridge

Exhibit 5-11



Northbound I-5 Vehicle Demands - PM Peak
Existing (2005)
4-Hour PM Peak Vehicle Demands - Northbound (Vehicles)
25,000
20,000
15,000
10,000
5,000
0
Marquam Bridge
McLoughlin
Morrison
I-84
Broadway/Weidler
I-405
Going
Alberta
Portland Blvd.
Victory/Denver
Marine Dr.
Hayden Is.
SR14
Mill Plain
4th Plain
39th
Main St.
78th St.
99th St.
139th St.
I-205
179th St.
219th St.
Pioneer St.

Exhibit 5-12



Southbound I-205 Vehicle Demands - AM Peak
Existing (2005)
2-Hour AM Peak Vehicle Demands - Southbound (Vehicles)
15,000
12,000
9,000
6,000
3,000
0
I-205 north of SR-500
SR-500 WB
SR-500 EB/4th Plain Blvd.
18th Street
Mill Plain WB
Mill Plain EB
SR-14 WB
SR-14 EB
Airport Way WB
Airport Way EB
Columbia Blvd.
I-84 WB
I-84 EB
Glisan Street

Exhibit 5-13

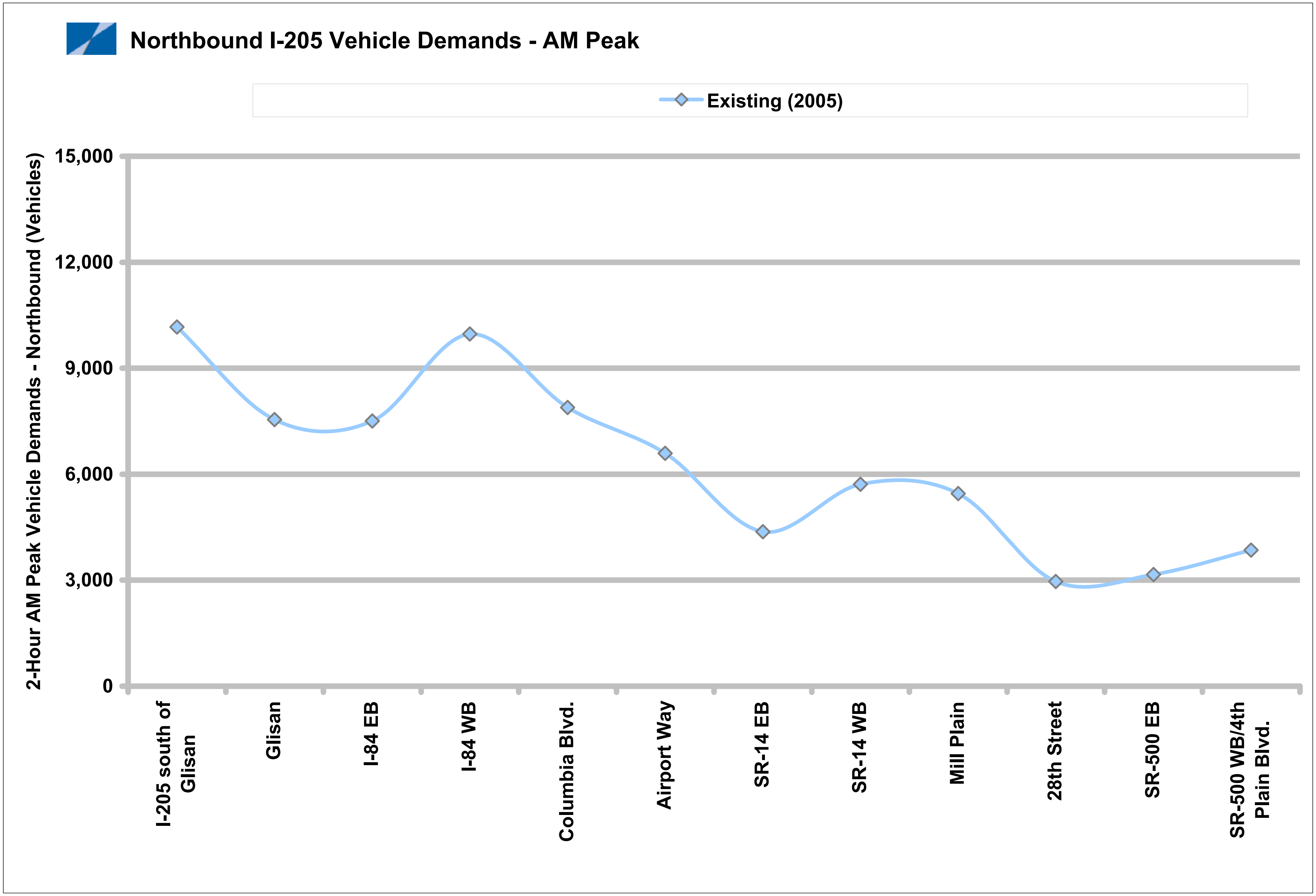
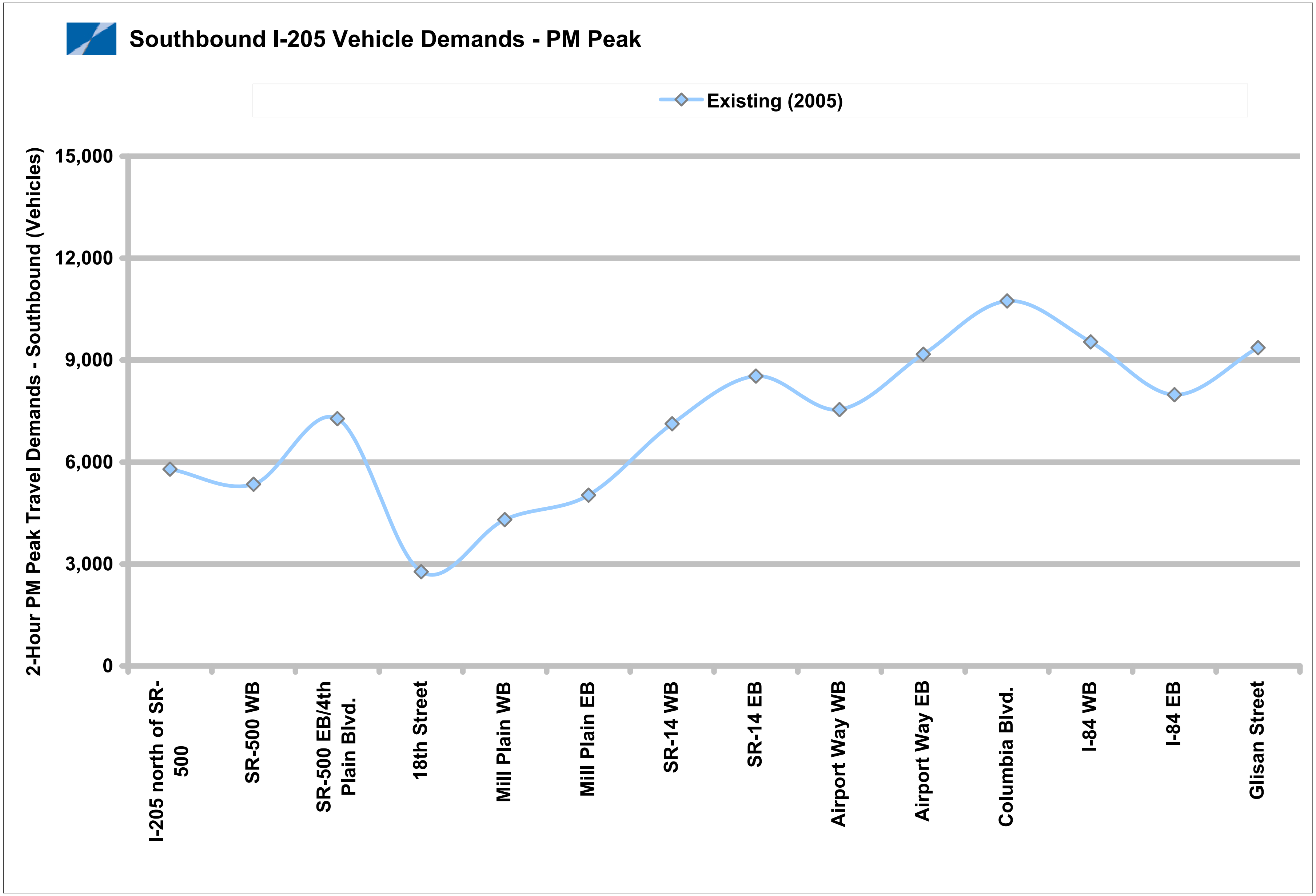
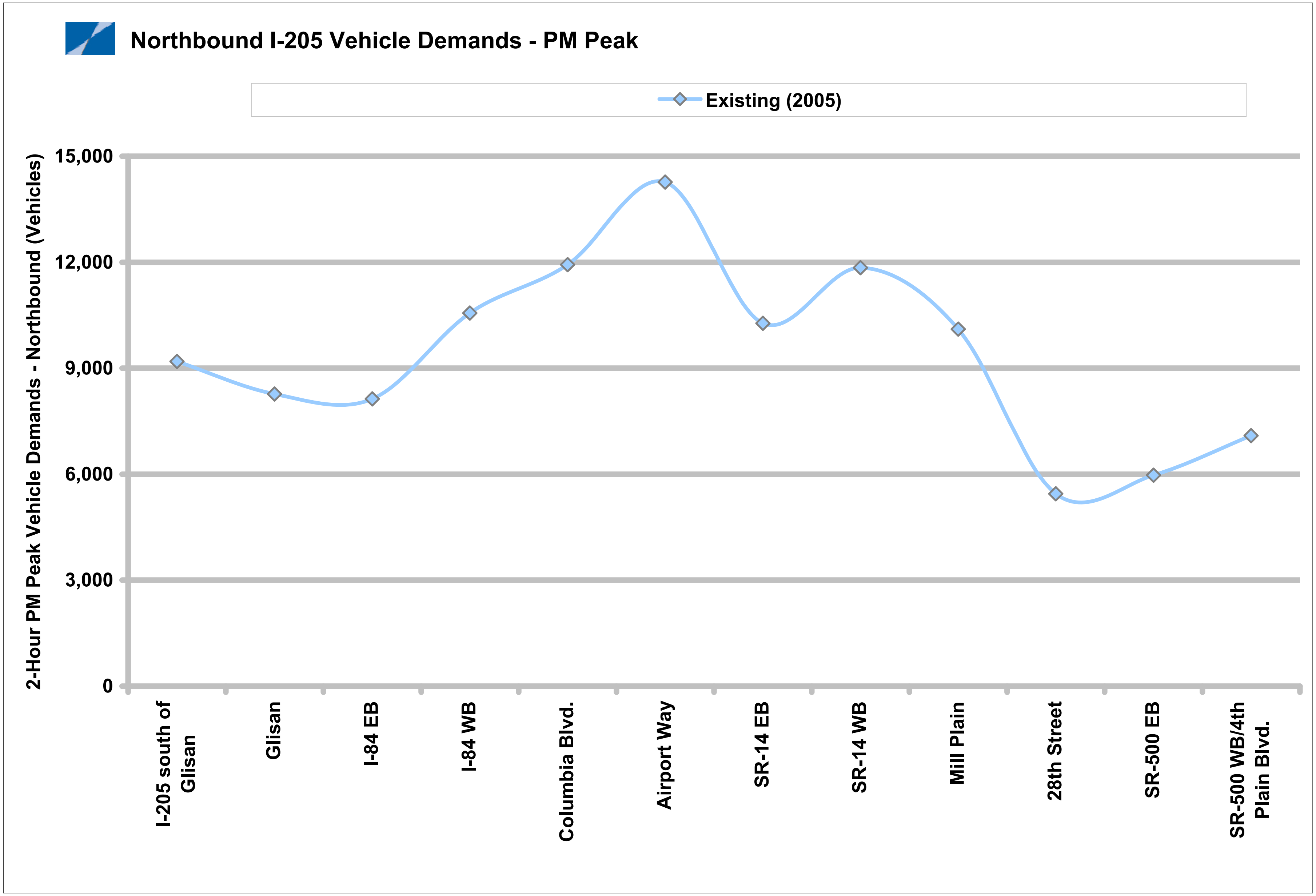

Northbound I-205 Vehicle Demands - AM Peak
Existing (2005)
2-Hour AM Peak Vehicle Demands - Northbound (Vehicles)
15,000
12,000
9,000
6,000
3,000
0
I-205 south of Glisan
Glisan
I-84 EB
I-84 WB
Columbia Blvd.
Airport Way
SR-14 EB
SR-14 WB
Mill Plain
28th Street
SR-500 EB
SR-500 WB/4th Plain Blvd.

Exhibit 5-14



Southbound I-205 Vehicle Demands - PM Peak
Existing (2005)
2-Hour PM Peak Travel Demands - Southbound (Vehicles)
15,000
12,000
9,000
6,000
3,000
0
I-205 north of SR-500
SR-500 WB
SR-500 EB/4th Plain Blvd.
18th Street
Mill Plain WB
Mill Plain EB
SR-14 WB
SR-14 EB
Airport Way WB
Airport Way EB
Columbia Blvd.
I-84 WB
I-84 EB
Glisan Street

Exhibit 5-15



Northbound I-205 Vehicle Demands - PM Peak
Existing (2005)
2-Hour PM Peak Vehicle Demands - Northbound (Vehicles)
15,000
12,000
9,000
6,000
3,000
0
I-205 south of Glisan
Glisan
I-84 EB
I-84 WB
Columbia Blvd.
Airport Way
SR-14 EB
SR-14 WB
Mill Plain
28th Street
SR-500 EB
SR-500 WB/4th Plain Blvd.

Exhibit 5-16

2005 Mid-day (12:00-1:00 PM) Truck Ramp Volumes (% trucks relative to all traffic)

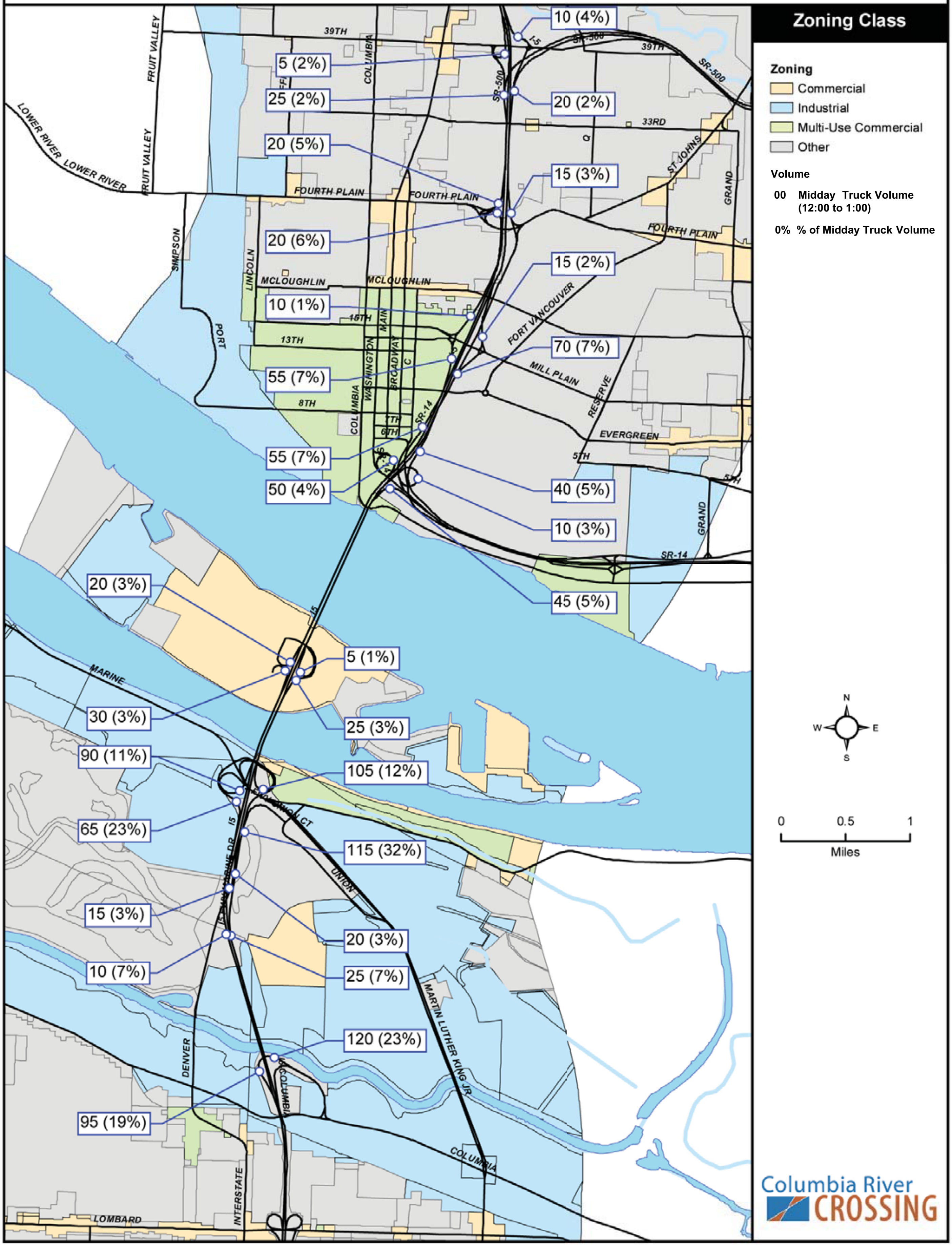


Exhibit 5-17

Portland-Vancouver Region Freight Tonnage by Mode		
	Year 2000 Volume	
Mode	**Tons (millions)**	**Market Share**
Truck	197.2	67%
Rail	32.9	11%
Ocean	28.4	10%
Barge	15.1	5%
Pipeline	22.2	7%
Air	0.4	< 1 percent
TOTAL	**296.2**	**100%**

Source: Portland/Vancouver International and Domestic Trade Capacity Analysis 2006

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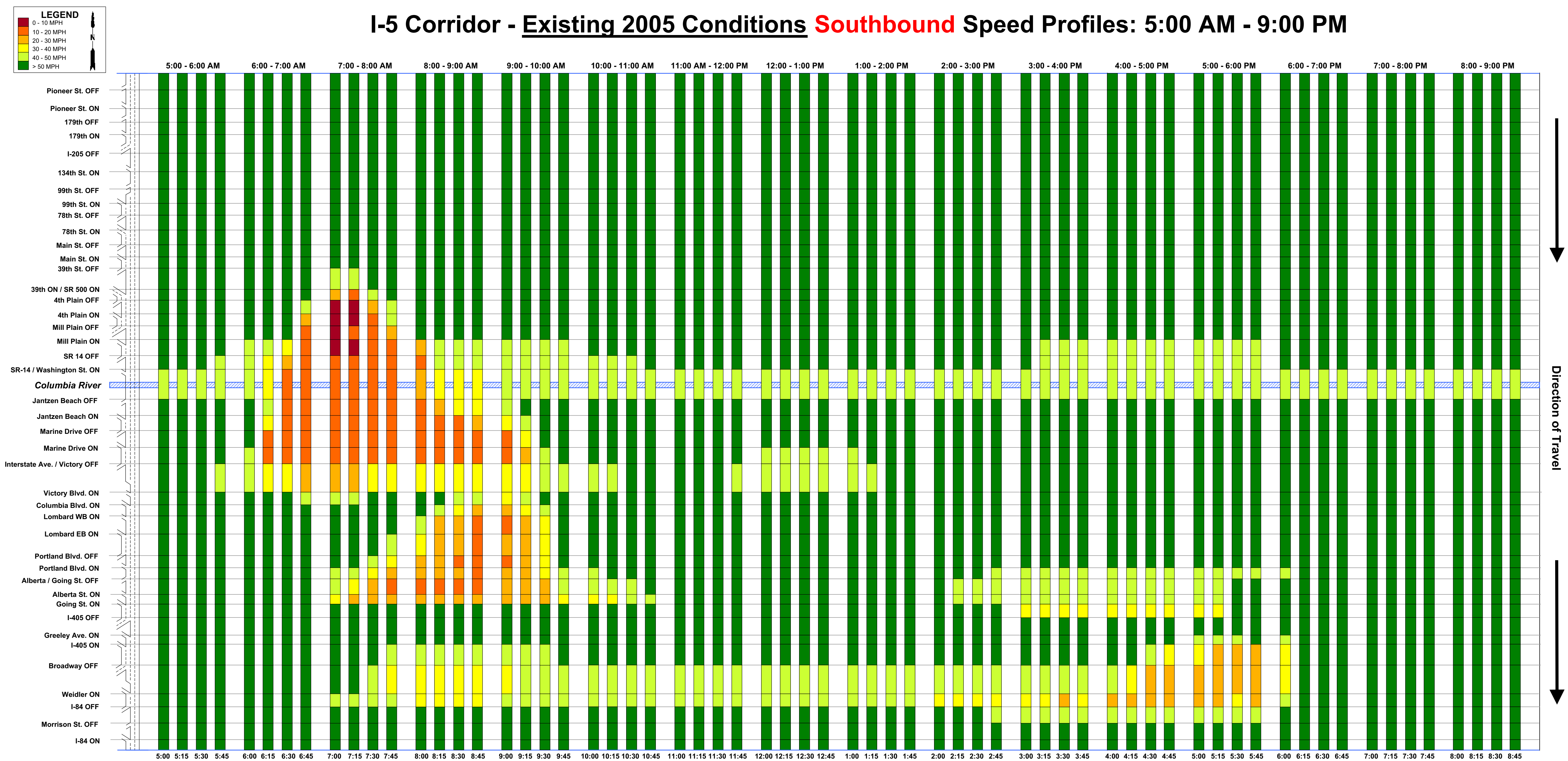
Exhibit 5-18



I-5 Corridor - Existing 2005 Conditions Southbound Speed Profiles: 5:00 AM - 9:00 PM
LEGEND
0 - 10 MPH
10 - 20 MPH
20 - 30 MPH
30 - 40 MPH
40 - 50 MPH
> 50 MPH
5:00 - 6:00 AM
6:00 - 7:00 AM
7:00 - 8:00 AM
8:00 - 9:00 AM
9:00 - 10:00 AM
10:00 - 11:00 AM
11:00 AM - 12:00 PM
12:00 - 1:00 PM
1:00 - 2:00 PM
2:00 - 3:00 PM
3:00 - 4:00 PM
4:00 - 5:00 PM
5:00 - 6:00 PM
6:00 - 7:00 PM
7:00 - 8:00 PM
8:00 - 9:00 PM
Pioneer St. OFF
Pioneer St. ON
179th OFF
179th ON
I-205 OFF
134th St. ON
99th St. OFF
99th St. ON
78th St. OFF
78th St. ON
Main St. OFF
Main St. ON
39th St. OFF
39th ON / SR 500 ON
4th Plain OFF
4th Plain ON
Mill Plain OFF
Mill Plain ON
SR 14 OFF
SR-14 / Washington St. ON
Columbia River
Jantzen Beach OFF
Jantzen Beach ON
Marine Drive OFF
Marine Drive ON
Interstate Ave. / Victory OFF
Victory Blvd. ON
Columbia Blvd. ON
Lombard WB ON
Lombard EB ON
Portland Blvd. OFF
Portland Blvd. ON
Alberta / Going St. OFF
Alberta St. ON
Going St. ON
I-405 OFF
Greeley Ave. ON
I-405 ON
Broadway OFF
Weidler ON
I-84 OFF
Morrison St. OFF
I-84 ON
Direction of Travel
5:00 5:15 5:30 5:45 6:00 6:15 6:30 6:45 7:00 7:15 7:30 7:45 8:00 8:15 8:30 8:45 9:00 9:15 9:30 9:45 10:00 10:15 10:30 10:45 11:00 11:15 11:30 11:45 12:00 12:15 12:30 12:45 1:00 1:15 1:30 1:45 2:00 2:15 2:30 2:45 3:00 3:15 3:30 3:45 4:00 4:15 4:30 4:45 5:00 5:15 5:30 5:45 6:00 6:15 6:30 6:45 7:00 7:15 7:30 7:45 8:00 8:15 8:30 8:45

Exhibit 5-19


I-5 Corridor - Existing 2005 Conditions Northbound Speed Profiles: 5:00 AM - 9:00 PM
LEGEND
0 - 10 MPH
10 - 20 MPH
20 - 30 MPH
30 - 40 MPH
40 - 50 MPH
> 50 MPH
N
5:00 - 6:00 AM
6:00 - 7:00 AM
7:00 - 8:00 AM
8:00 - 9:00 AM
9:00 - 10:00 AM
10:00 - 11:00 AM
11:00 AM - 12:00 PM
12:00 - 1:00 PM
1:00 - 2:00 PM
2:00 - 3:00 PM
3:00 - 4:00 PM
4:00 - 5:00 PM
5:00 - 6:00 PM
6:00 - 7:00 PM
7:00 - 8:00 PM
8:00 - 9:00 PM
Direction of Travel
Pioneer St. ON
Pioneer St. OFF
179th ON
179th OFF
I-205 ON
134th St. OFF
99th St. ON
99th St. OFF
78th St. ON
78th St. OFF
Main St. ON
Main St. OFF
39th St. ON
SR-500 / 39th OFF
4th Plain ON
Mill Plain ON
Mill Plain / 4th Plain OFF
SR-14 ON
City Center OFF
SR-14 OFF
Columbia River
Jantzen Beach ON
Jantzen Beach OFF
Marine Drive ON
Interstate Ave. / Victory ON
Marine Drive OFF
Victory Blvd. OFF
Columbia Blvd. OFF
Lombard WB OFF
Lombard EB OFF
Portland Blvd. ON
Portland Blvd. OFF
Alberta St. ON
Going St. ON
Going St. OFF
I-405 ON
Greeley Ave. OFF
I-405 OFF
Broadway ON
Weidler OFF
I-84 ON
Morrison St. ON
I-84 OFF
5:00 5:15 5:30 5:45 6:00 6:15 6:30 6:45 7:00 7:15 7:30 7:45 8:00 8:15 8:30 8:45 9:00 9:15 9:30 9:45 10:00 10:15 10:30 10:45 11:00 11:15 11:30 11:45 12:00 12:15 12:30 12:45 1:00 1:15 1:30 1:45 2:00 2:15 2:30 2:45 3:00 3:15 3:30 3:45 4:00 4:15 4:30 4:45 5:00 5:15 5:30 5:45 6:00 6:15 6:30 6:45 7:00 7:15 7:30 7:45 8:00 8:15 8:30 8:45

Exhibit 5-20

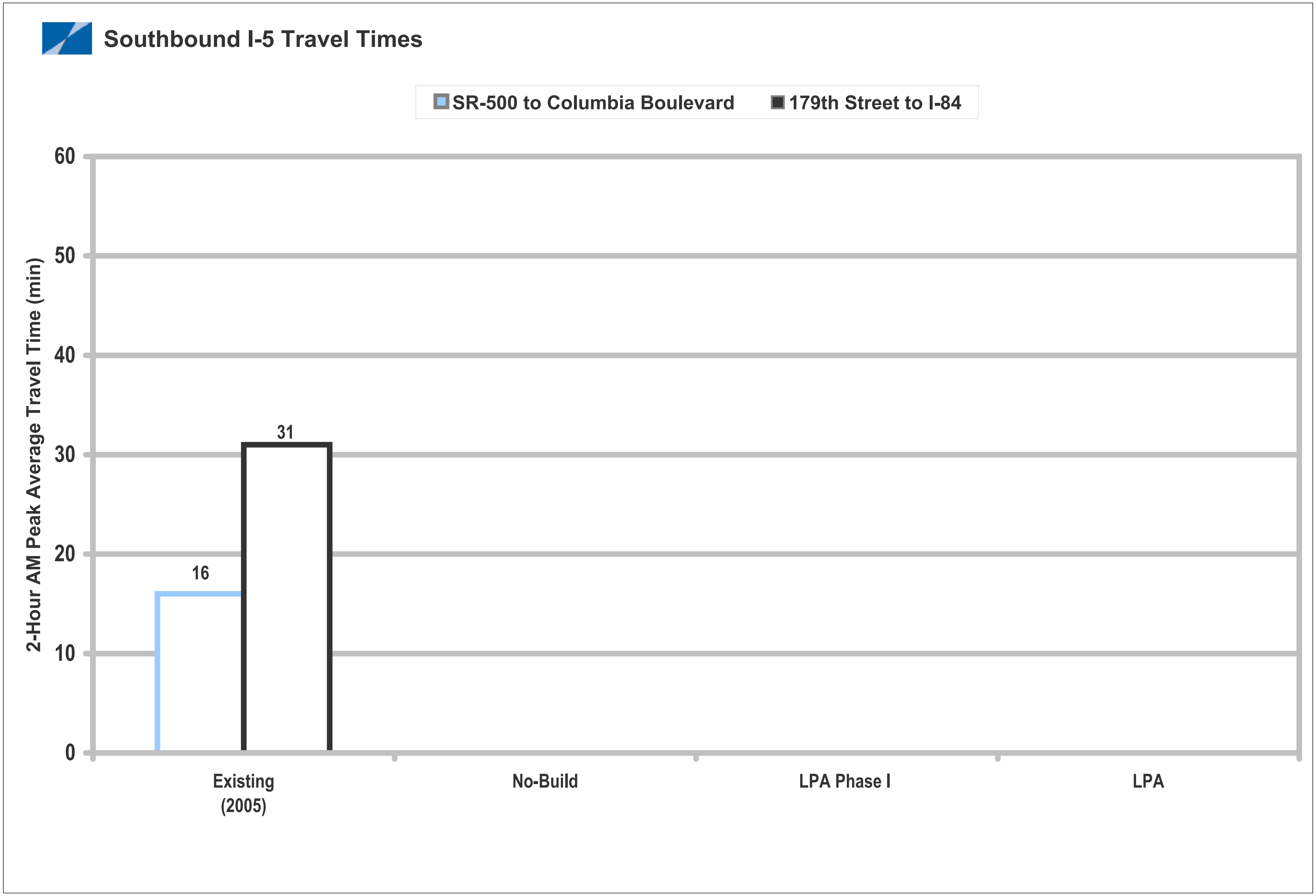
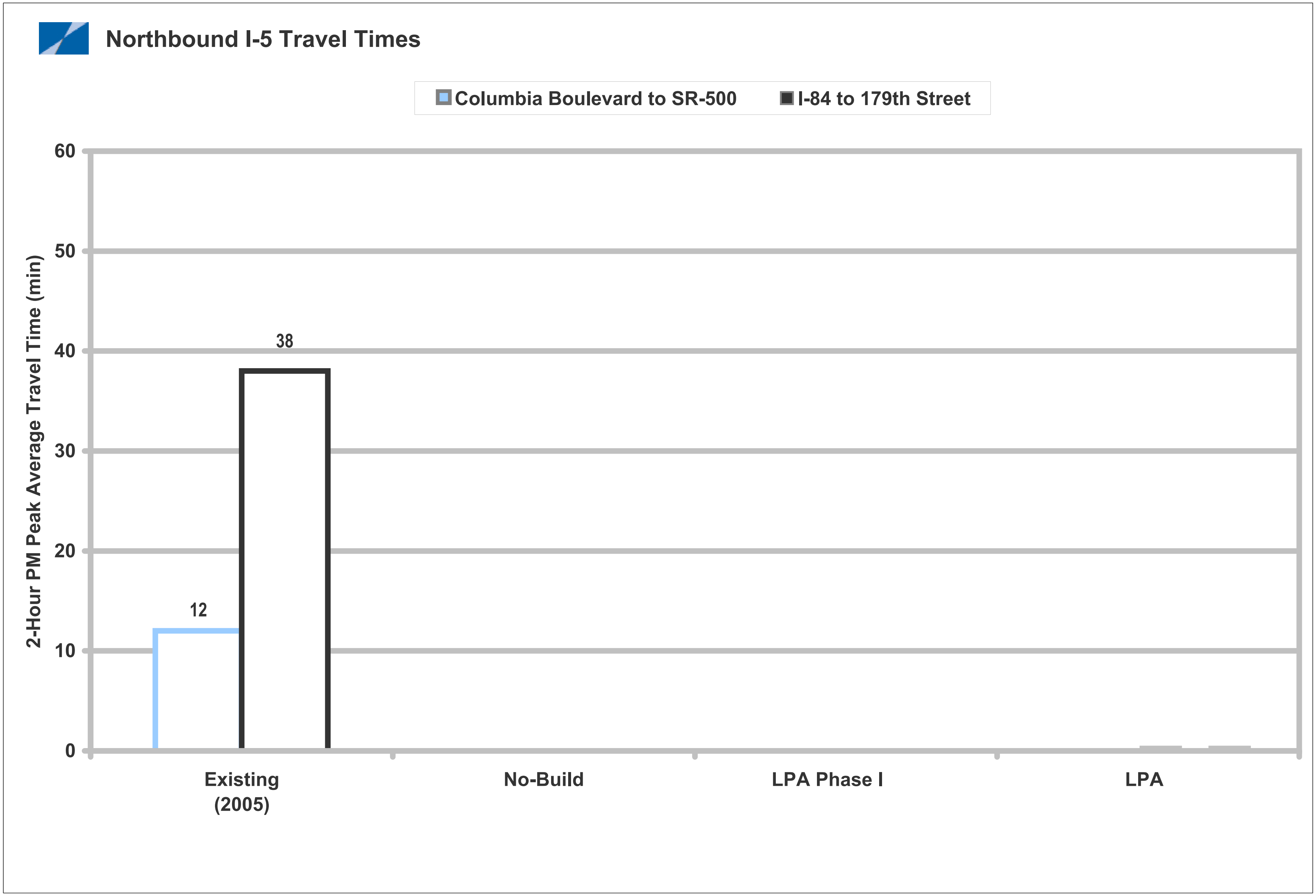

Southbound I-5 Travel Times
SR-500 to Columbia Boulevard
179th Street to I-84
2-Hour AM Peak Average Travel Time (min)
60
50
40
30
20
10
0
16
31
Existing (2005)
No-Build
LPA Phase I
LPA

Exhibit 5-21



Northbound I-5 Travel Times
Columbia Boulevard to SR-500
I-84 to 179th Street
60
50
40
30
20
10
0
2-Hour PM Peak Average Travel Time (min)
12
38
Existing (2005)
No-Build
LPA Phase I
LPA

Exhibit 5-22

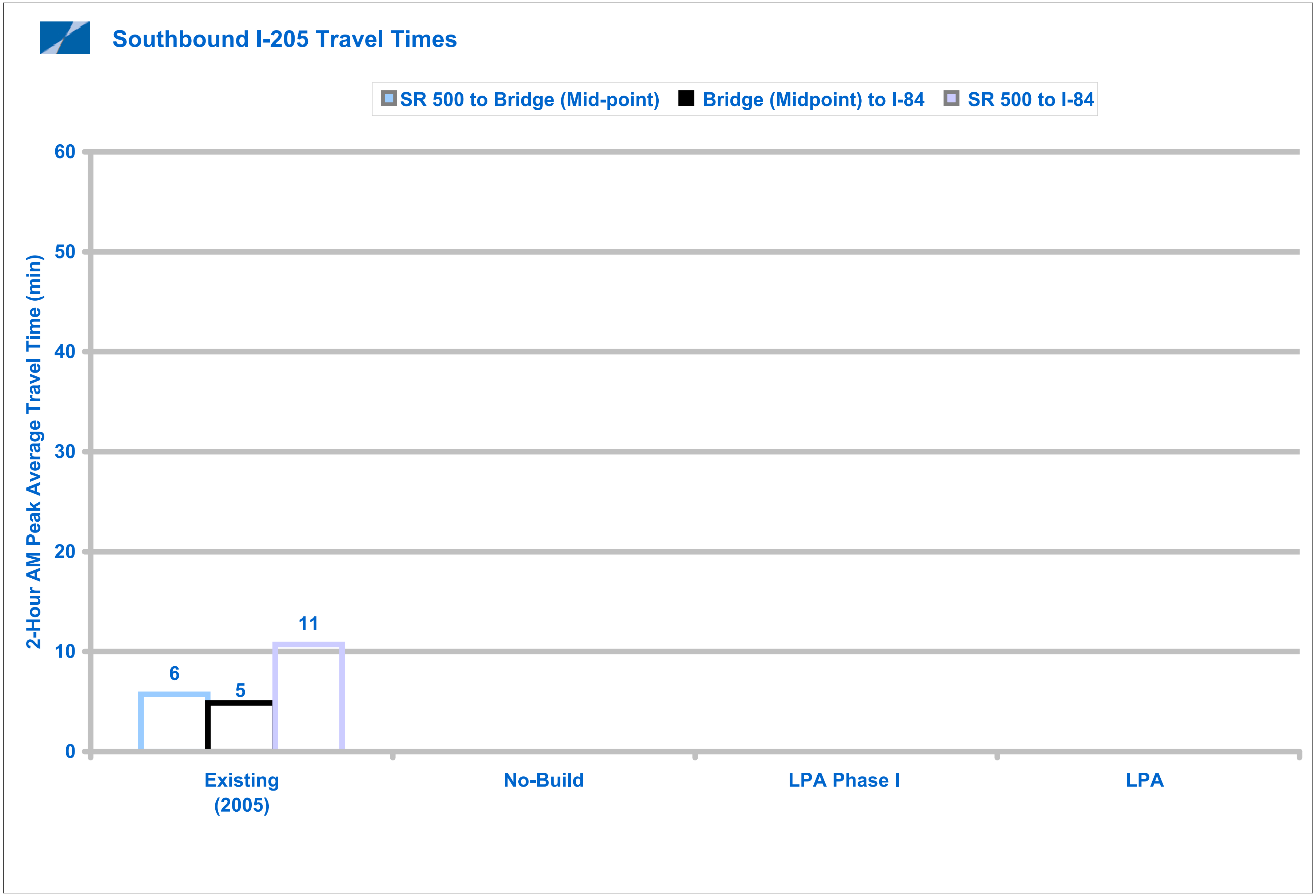

Southbound I-205 Travel Times
SR 500 to Bridge (Mid-point)
Bridge (Midpoint) to I-84
SR 500 to I-84
60
50
40
30
20
10
0
2-Hour AM Peak Average Travel Time (min)
6
5
11
Existing (2005)
No-Build
LPA Phase I
LPA

Exhibit 5-23

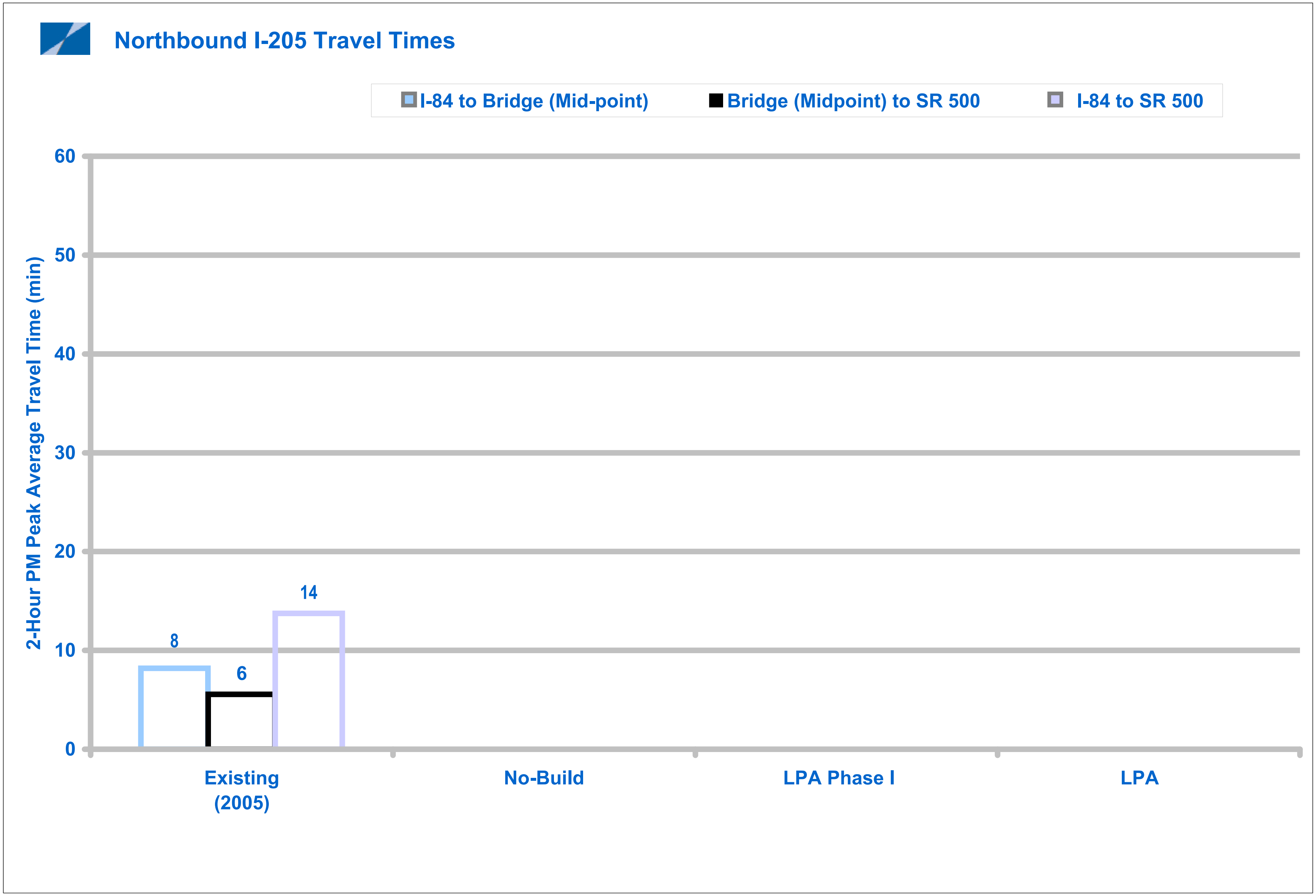
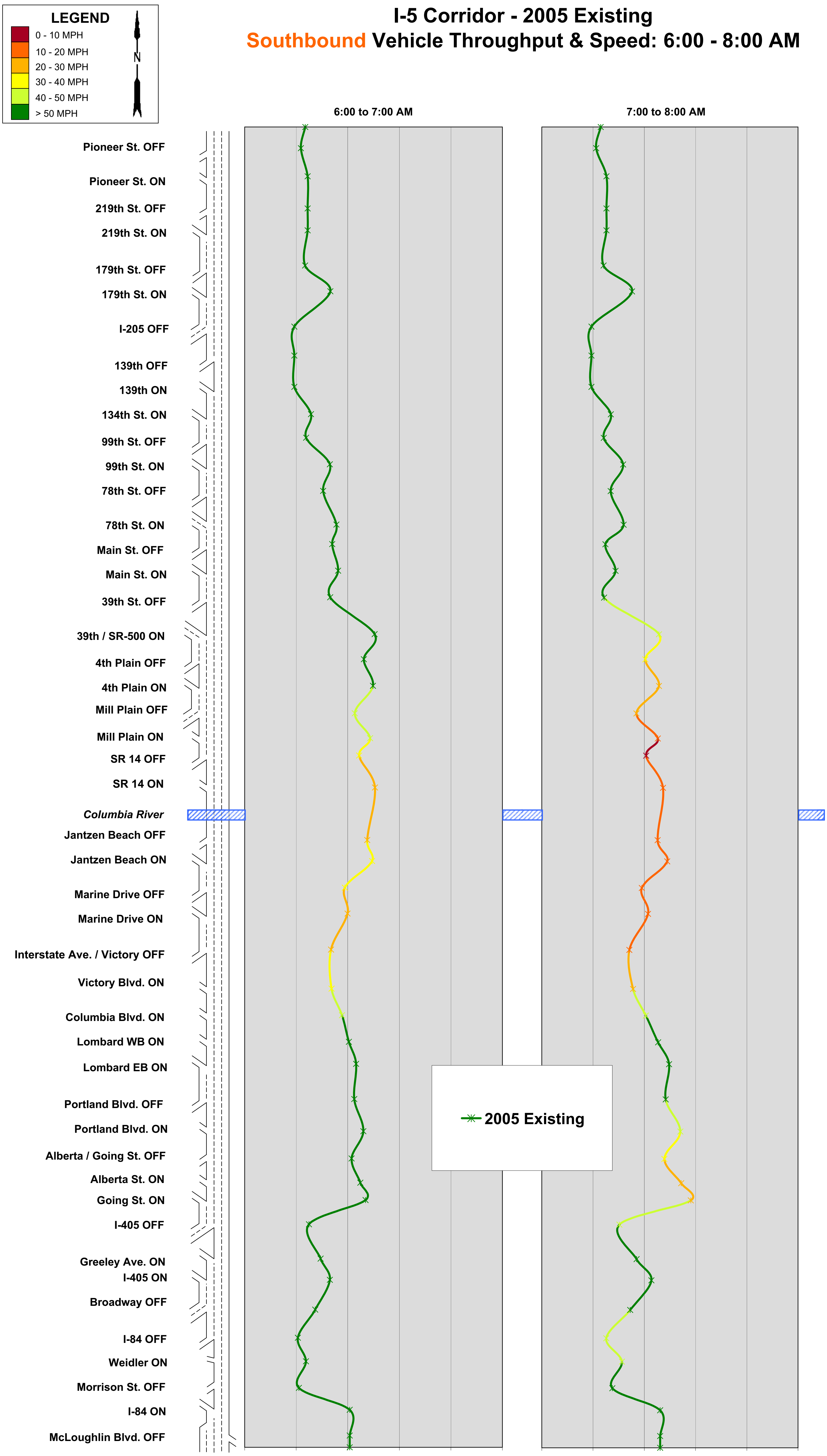

Northbound I-205 Travel Times
I-84 to Bridge (Mid-point)
Bridge (Midpoint) to SR 500
I-84 to SR 500
2-Hour PM Peak Average Travel Time (min)
60
50
40
30
20
10
0
8
6
14
Existing (2005)
No-Build
LPA Phase I
LPA

Exhibit 5-24



Continued on next page

Exhibit 5-24 - Continued

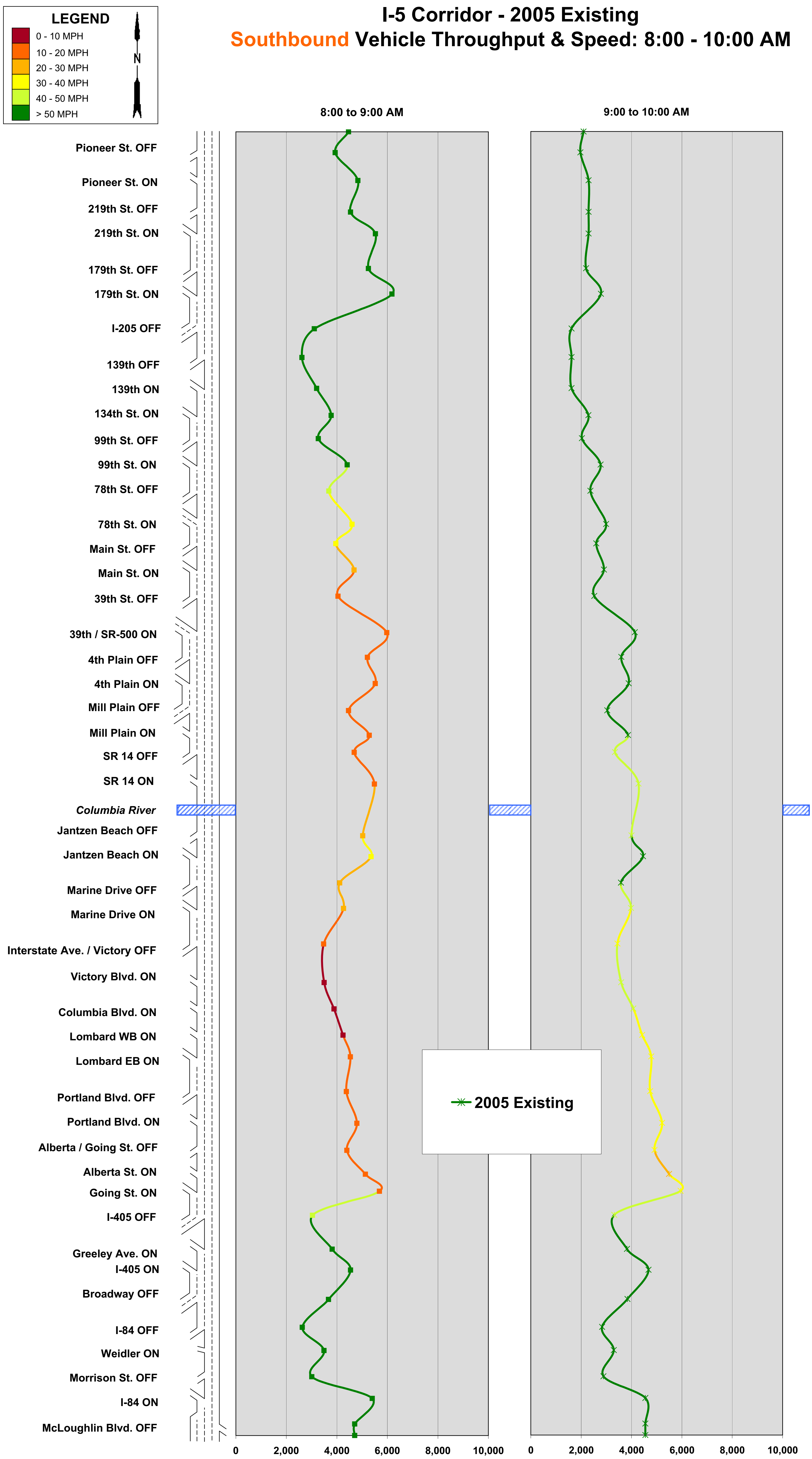
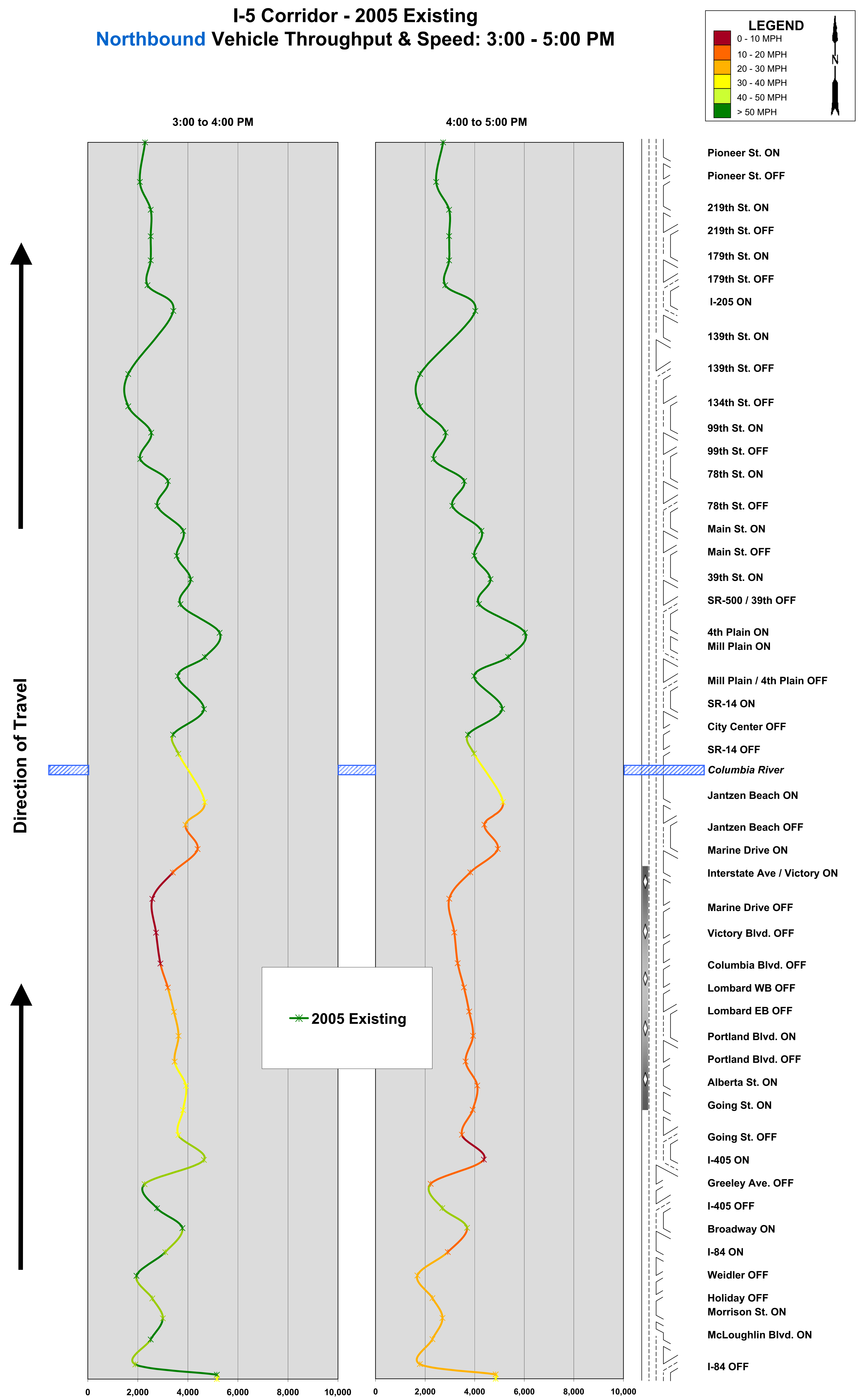


Exhibit 5-25



Continued on next page

Exhibit 5-25 - Continued

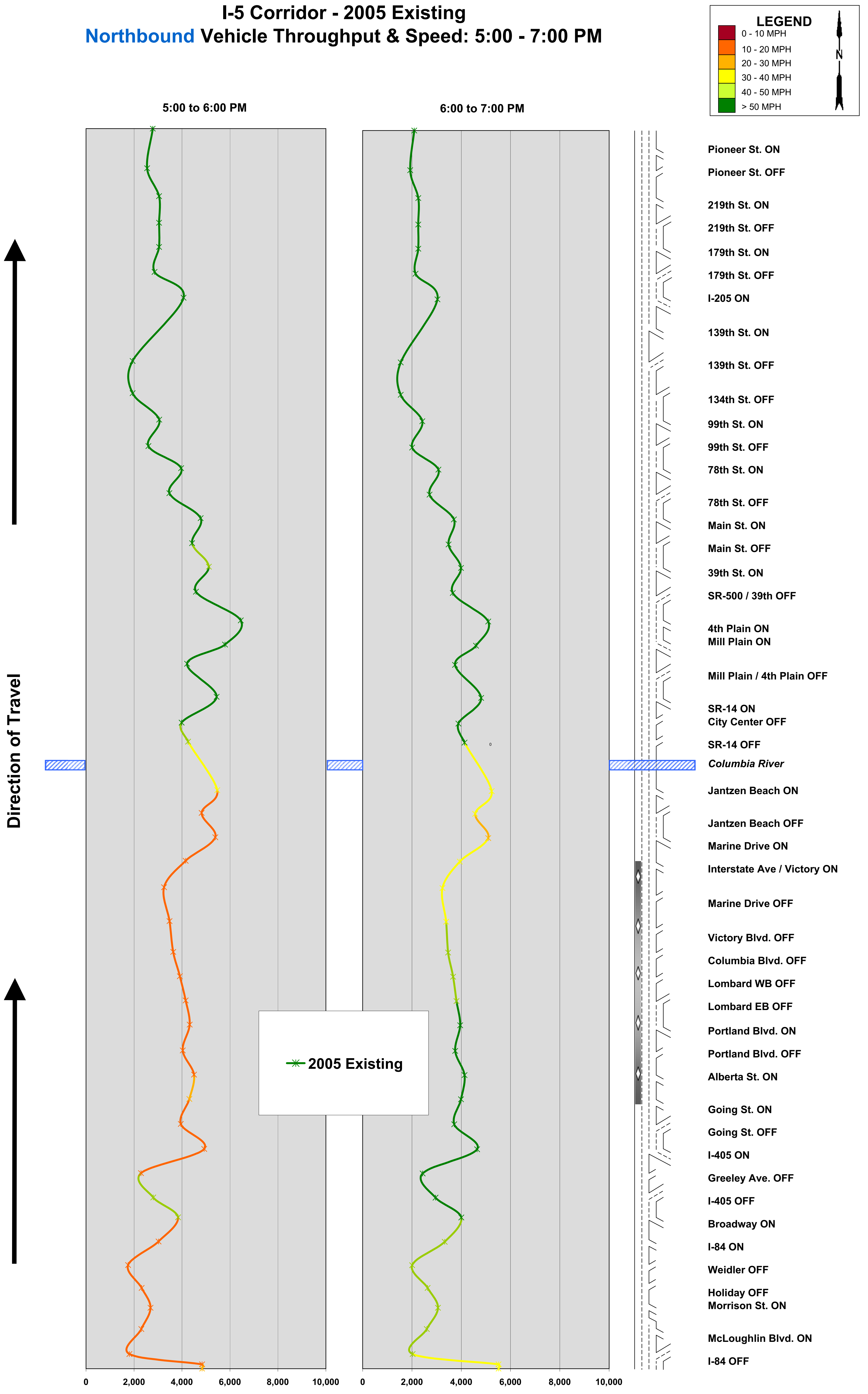
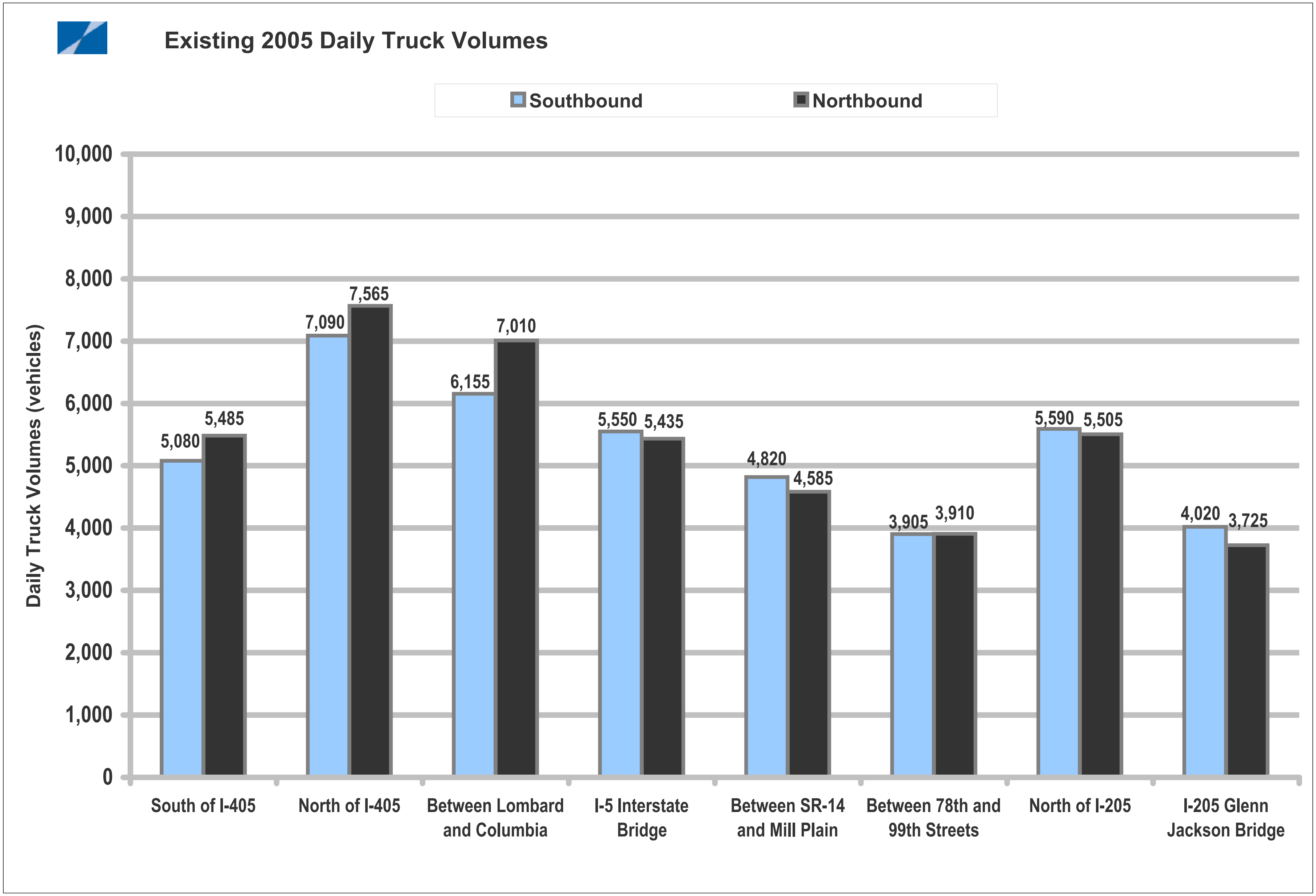
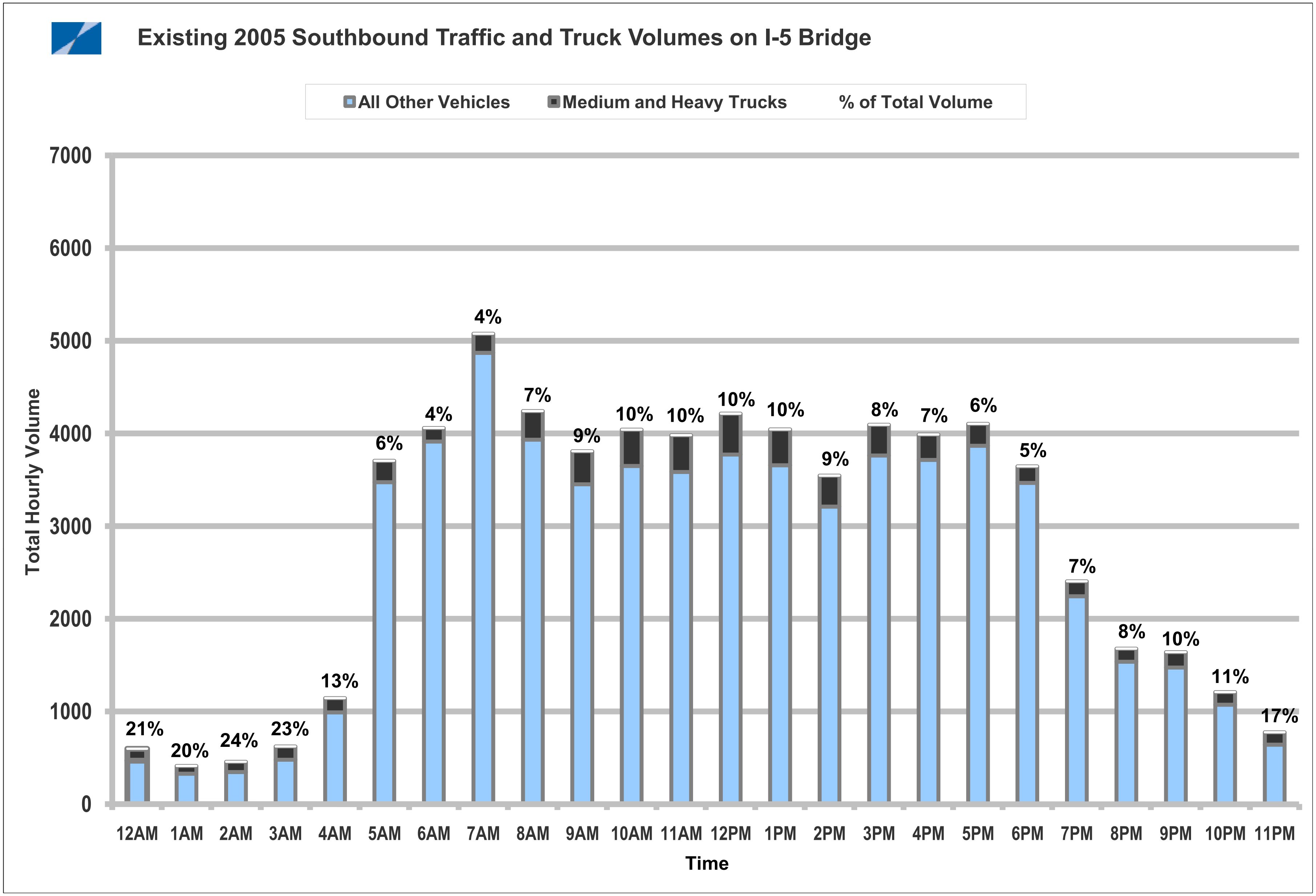


Exhibit 5-26



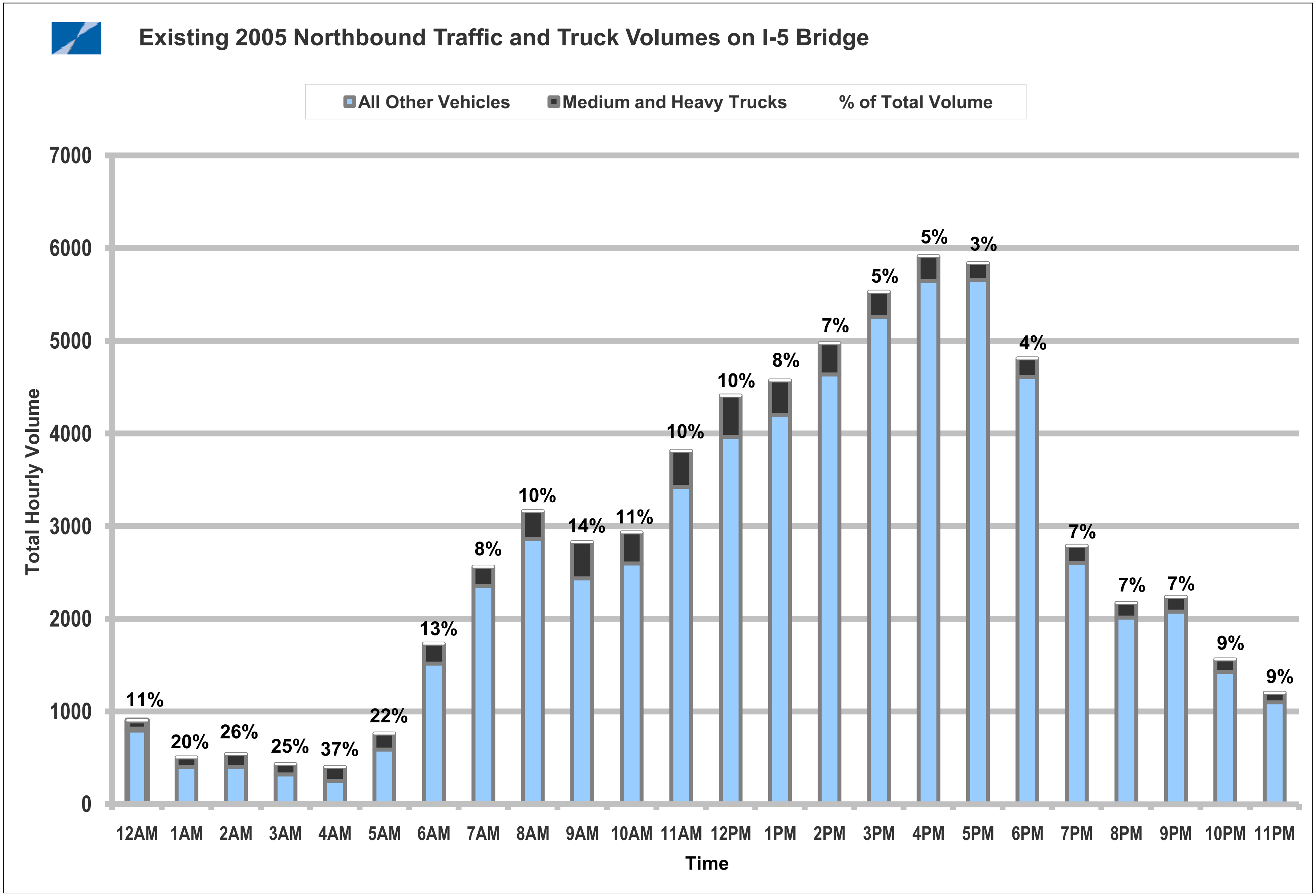
Existing 2005 Daily Truck Volumes
Southbound
Northbound
Daily Truck Volumes (vehicles)
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
5,080
5,485
7,090
7,565
6,155
7,010
5,550
5,435
4,820
4,585
3,905
3,910
5,590
5,505
4,020
3,725
South of I-405
North of I-405
Between Lombard and Columbia
I-5 Interstate Bridge
Between SR-14 and Mill Plain
Between 78th and 99th Streets
North of I-205
I-205 Glenn Jackson Bridge

Exhibit 5-27



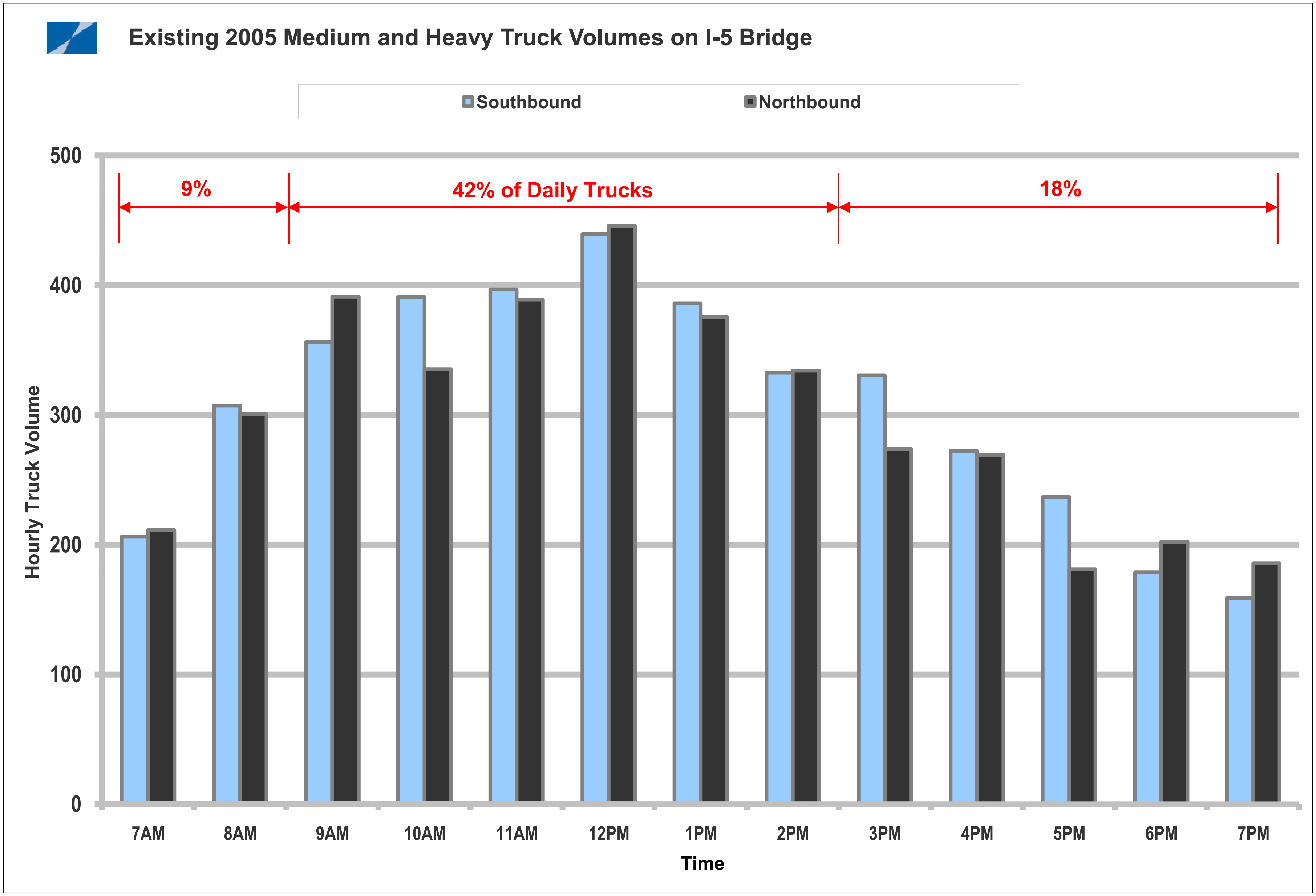
Existing 2005 Southbound Traffic and Truck Volumes on I-5 Bridge
All Other Vehicles
Medium and Heavy Trucks
% of Total Volume
Total Hourly Volume
7000
6000
5000
4000
3000
2000
1000
0
21%
20%
24%
23%
13%
6%
4%
4%
7%
9%
10%
10%
10%
10%
9%
8%
7%
6%
5%
7%
8%
10%
11%
17%
12AM
1AM
2AM
3AM
4AM
5AM
6AM
7AM
8AM
9AM
10AM
11AM
12PM
1PM
2PM
3PM
4PM
5PM
6PM
7PM
8PM
9PM
10PM
11PM
Time

Exhibit 5-28



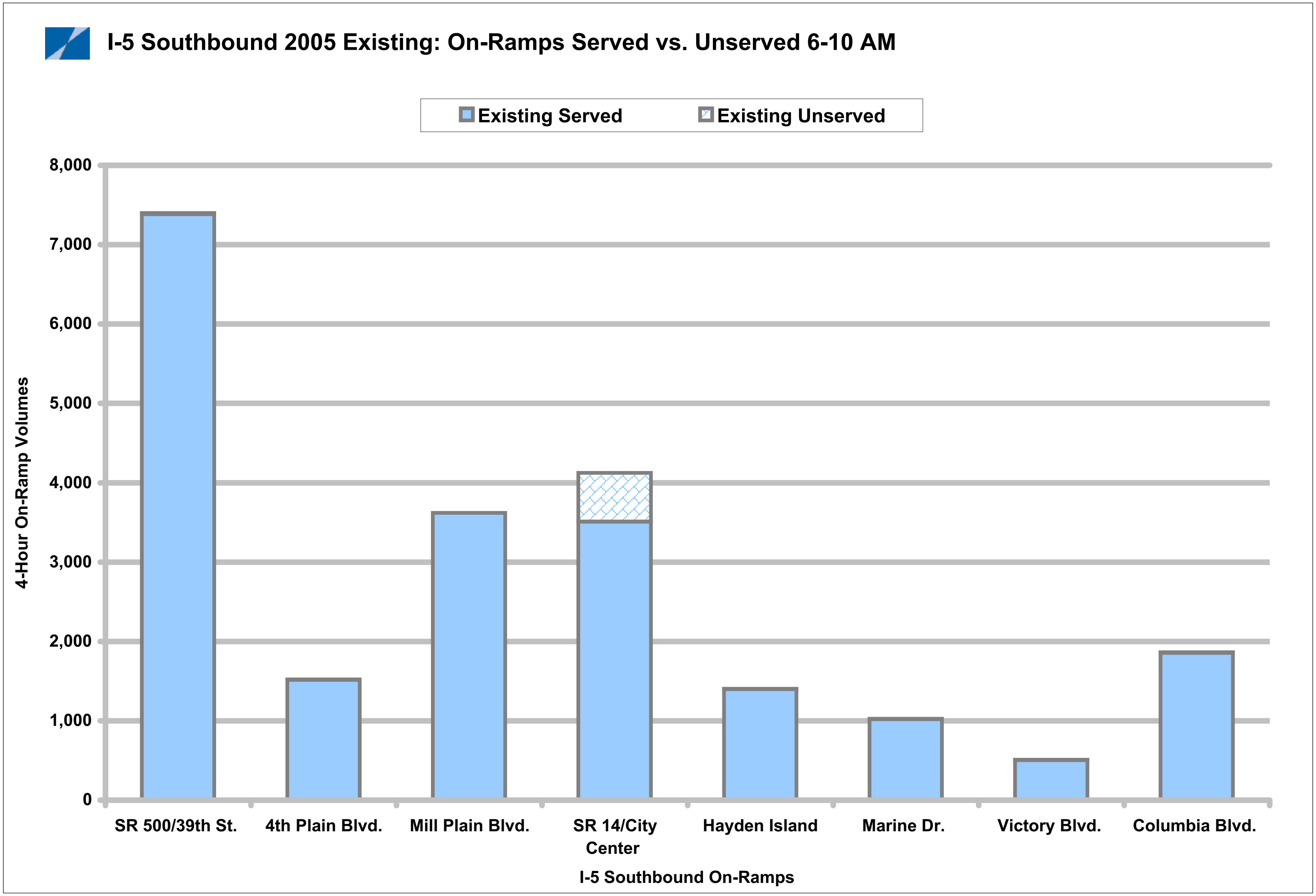
Existing 2005 Northbound Traffic and Truck Volumes on I-5 Bridge
All Other Vehicles
Medium and Heavy Trucks
% of Total Volume
Total Hourly Volume
7000
6000
5000
4000
3000
2000
1000
0
11%
20%
26%
25%
37%
22%
13%
8%
10%
14%
11%
10%
10%
8%
7%
5%
5%
3%
4%
7%
7%
7%
9%
9%
12AM
1AM
2AM
3AM
4AM
5AM
6AM
7AM
8AM
9AM
10AM
11AM
12PM
1PM
2PM
3PM
4PM
5PM
6PM
7PM
8PM
9PM
10PM
11PM
Time

Exhibit 5-29



Existing 2005 Medium and Heavy Truck Volumes on I-5 Bridge
Southbound
Northbound
9%
42% of Daily Trucks
18%
Hourly Truck Volume
0
100
200
300
400
500
7AM
8AM
9AM
10AM
11AM
12PM
1PM
2PM
3PM
4PM
5PM
6PM
7PM
Time

Exhibit 5-30



I-5 Southbound 2005 Existing: On-Ramps Served vs. Unserved 6-10 AM
Existing Served
Existing Unserved
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
4-Hour On-Ramp Volumes
SR 500/39th St.
4th Plain Blvd.
Mill Plain Blvd.
SR 14/City Center
Hayden Island
Marine Dr.
Victory Blvd.
Columbia Blvd.
I-5 Southbound On-Ramps

Exhibit 5-31

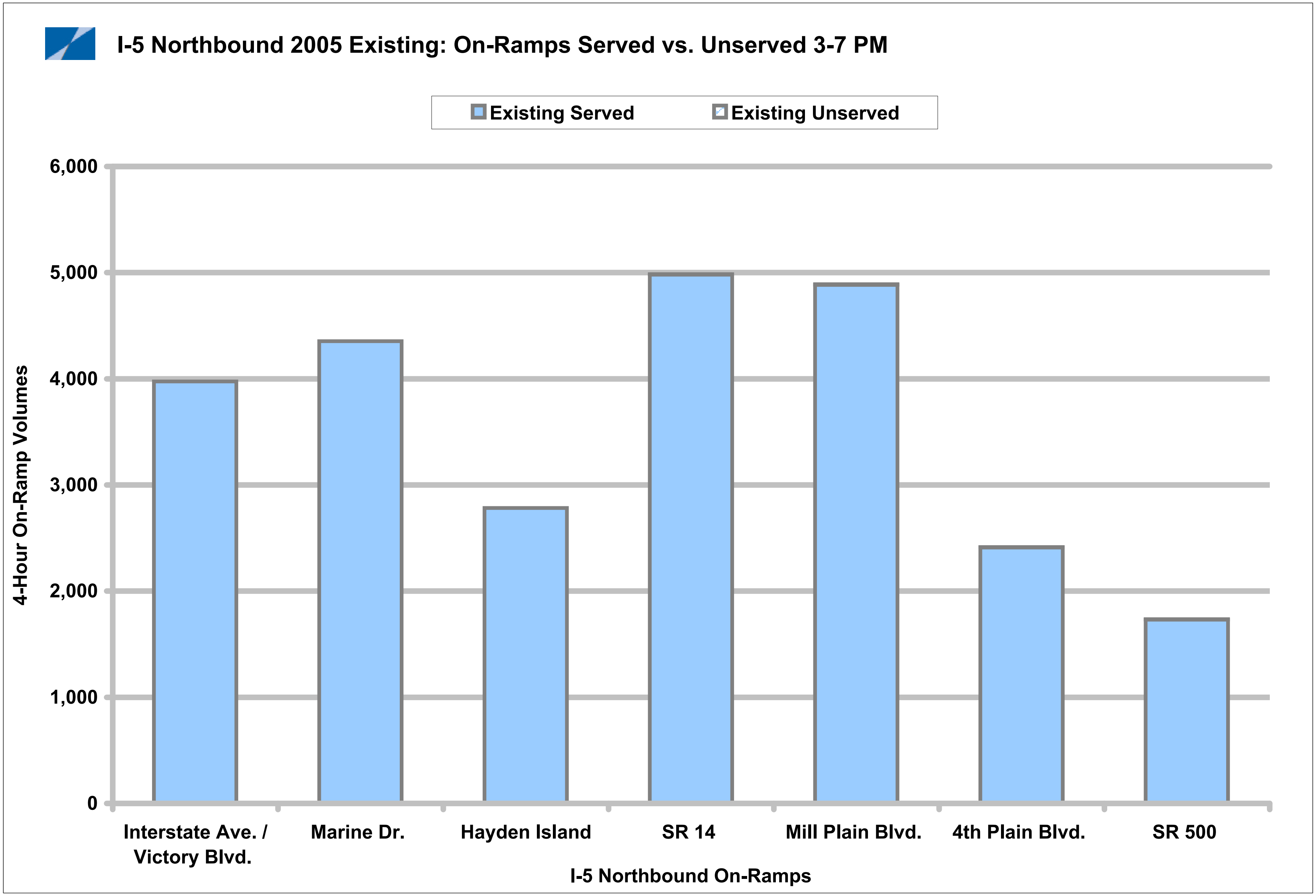

I-5 Northbound 2005 Existing: On-Ramps Served vs. Unserved 3-7 PM
Existing Served
Existing Unserved
6,000
5,000
4,000
3,000
2,000
1,000
0
4-Hour On-Ramp Volumes
Interstate Ave. / Victory Blvd.
Marine Dr.
Hayden Island
SR 14
Mill Plain Blvd.
4th Plain Blvd.
SR 500
I-5 Northbound On-Ramps

Exhibit 5-32

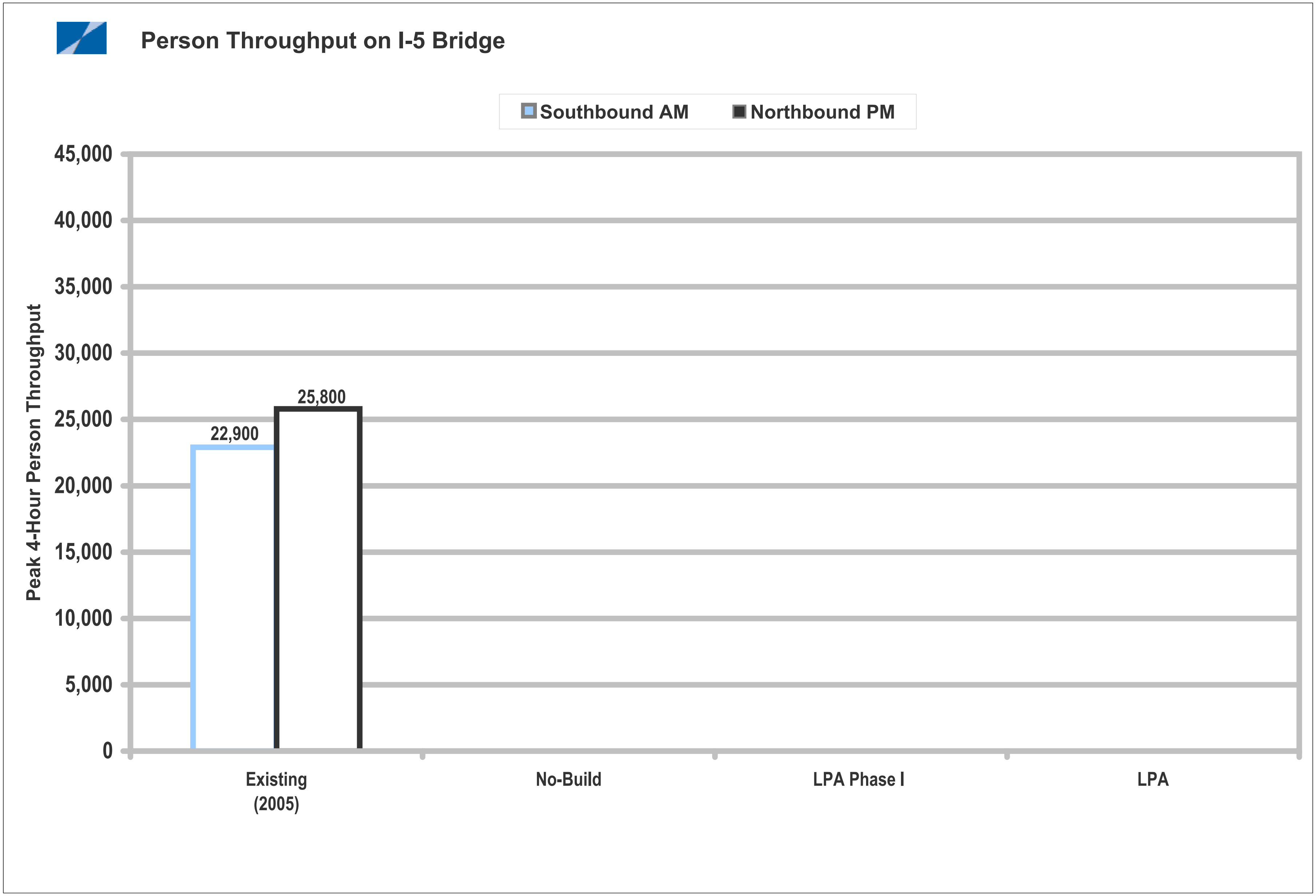
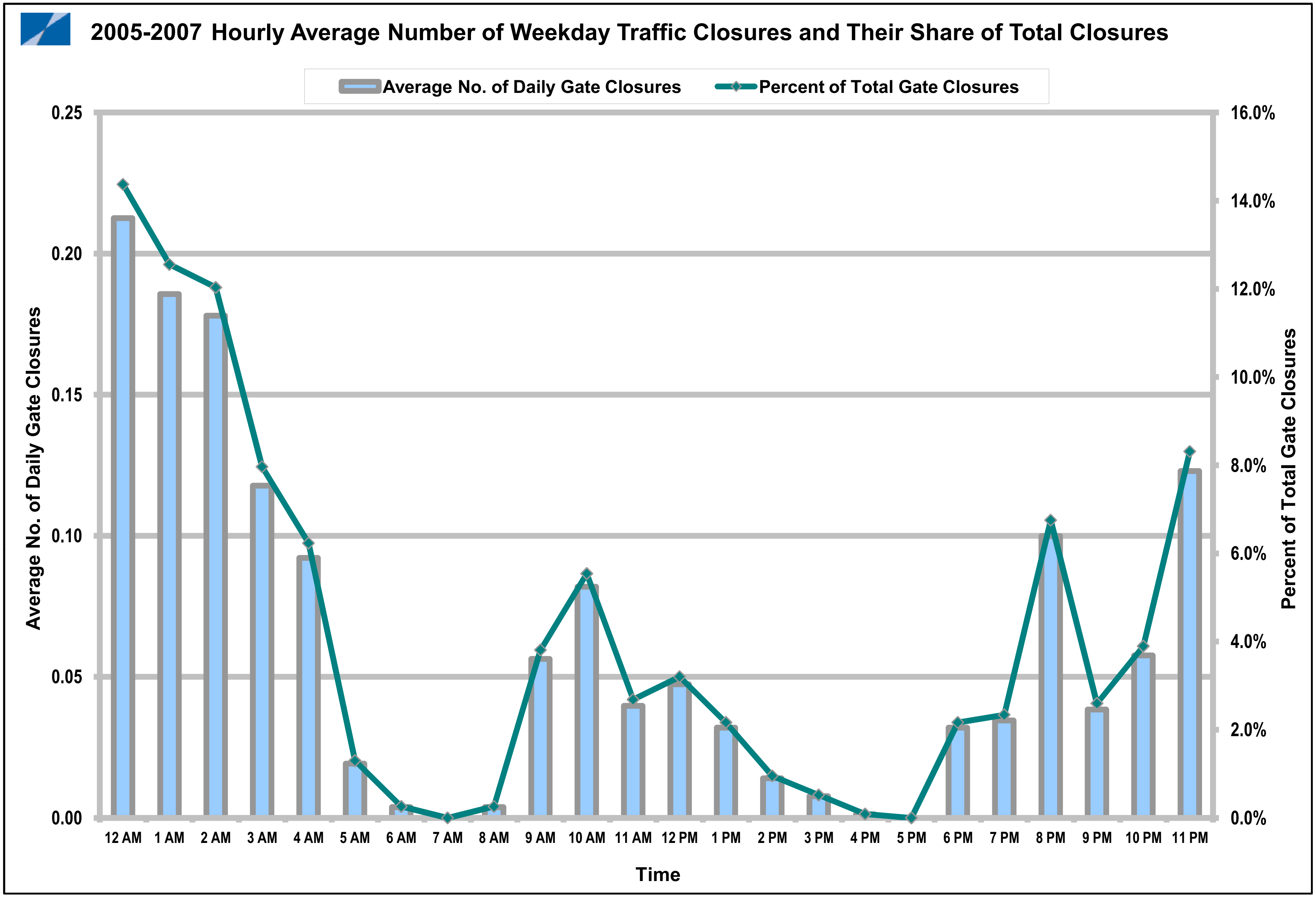

Person Throughput on I-5 Bridge
Southbound AM
Northbound PM
Peak 4-Hour Person Throughput
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
22,900
25,800
Existing (2005)
No-Build
LPA Phase I
LPA

Exhibit 5-33



2005-2007 Hourly Average Number of Weekday Traffic Closures and Their Share of Total Closures
Average No. of Daily Gate Closures
Percent of Total Gate Closures
0.25
0.20
0.15
0.10
0.05
0.00
16.0%
14.0%
12.0%
10.0%
8.0%
6.0%
4.0%
2.0%
0.0%
Average No. of Daily Gate Closures
Percent of Total Gate Closures
12 AM
1 AM
2 AM
3 AM
4 AM
5 AM
6 AM
7 AM
8 AM
9 AM
10 AM
11 AM
12 PM
1 PM
2 PM
3 PM
4 PM
5 PM
6 PM
7 PM
8 PM
9 PM
10 PM
11 PM
Time

Exhibit 5-34

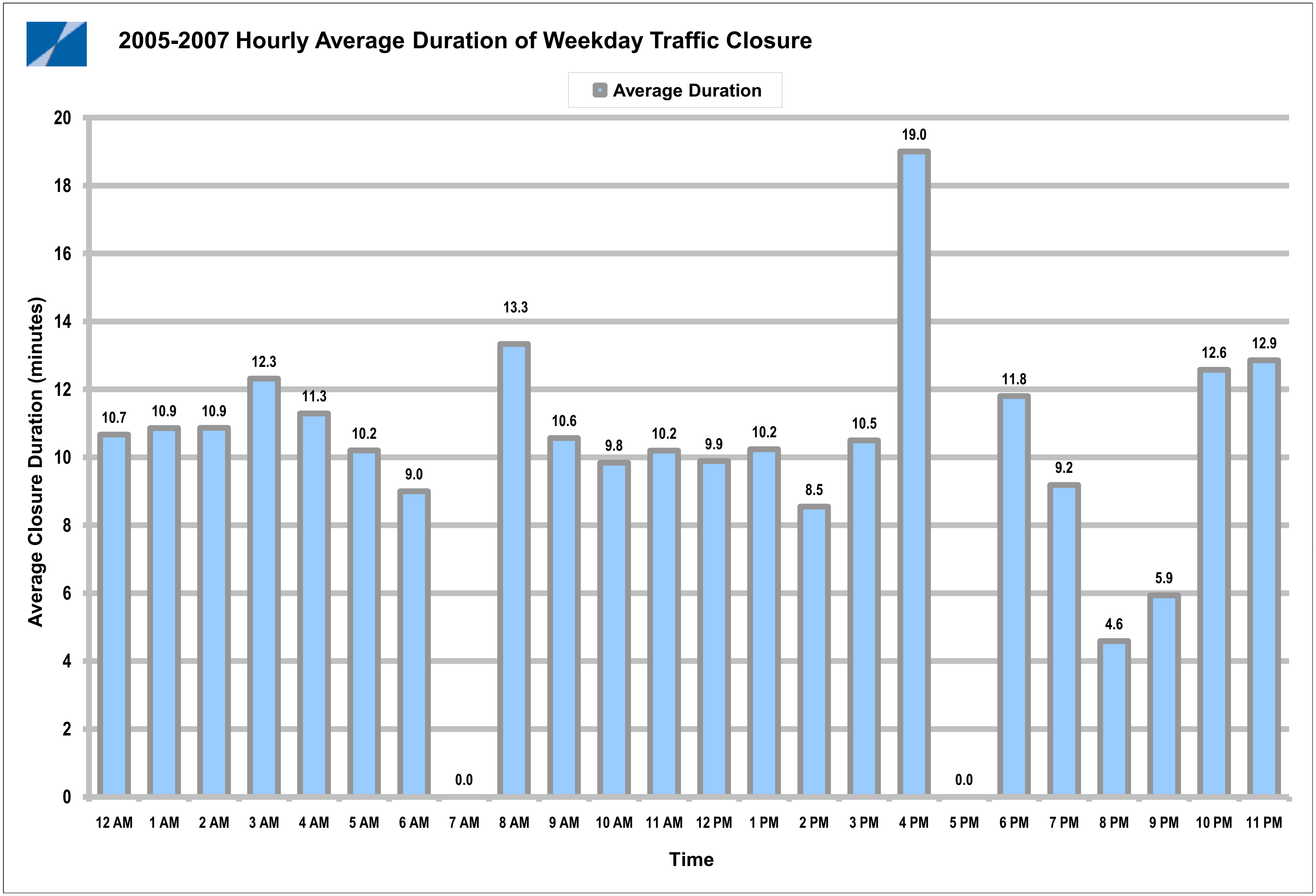

2005-2007 Hourly Average Duration of Weekday Traffic Closure
Average Duration
Average Closure Duration (minutes)
Time
20
18
16
14
12
10
8
6
4
2
0
10.7
10.9
10.9
12.3
11.3
10.2
9.0
0.0
13.3
10.6
9.8
10.2
9.9
10.2
8.5
10.5
19.0
0.0
11.8
9.2
4.6
5.9
12.6
12.9
12 AM
1 AM
2 AM
3 AM
4 AM
5 AM
6 AM
7 AM
8 AM
9 AM
10 AM
11 AM
12 PM
1 PM
2 PM
3 PM
4 PM
5 PM
6 PM
7 PM
8 PM
9 PM
10 PM
11 PM

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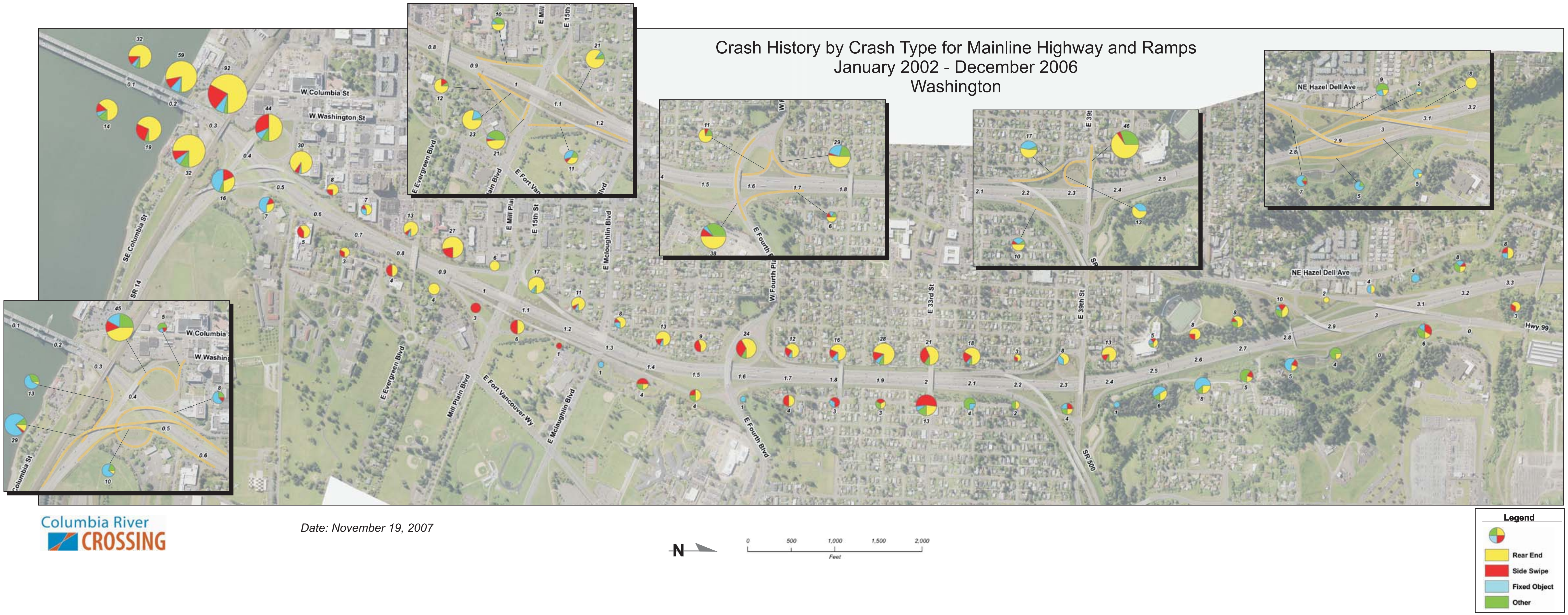
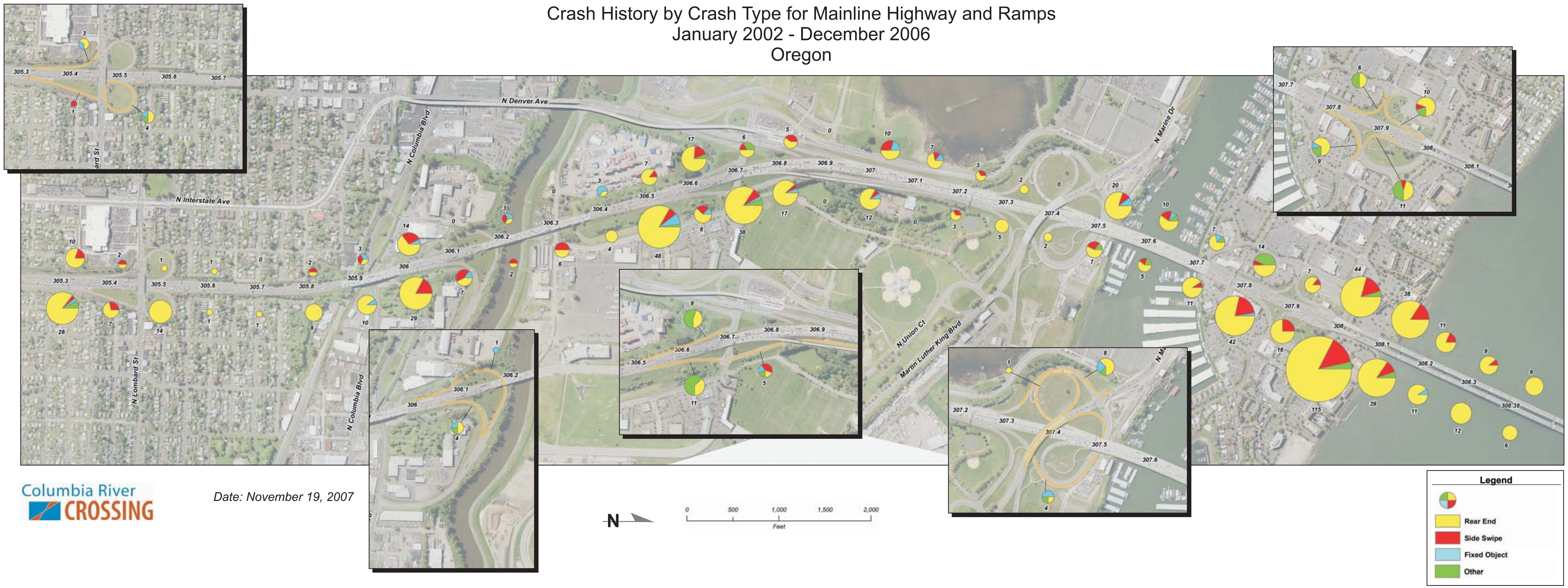
Exhibit 5-35



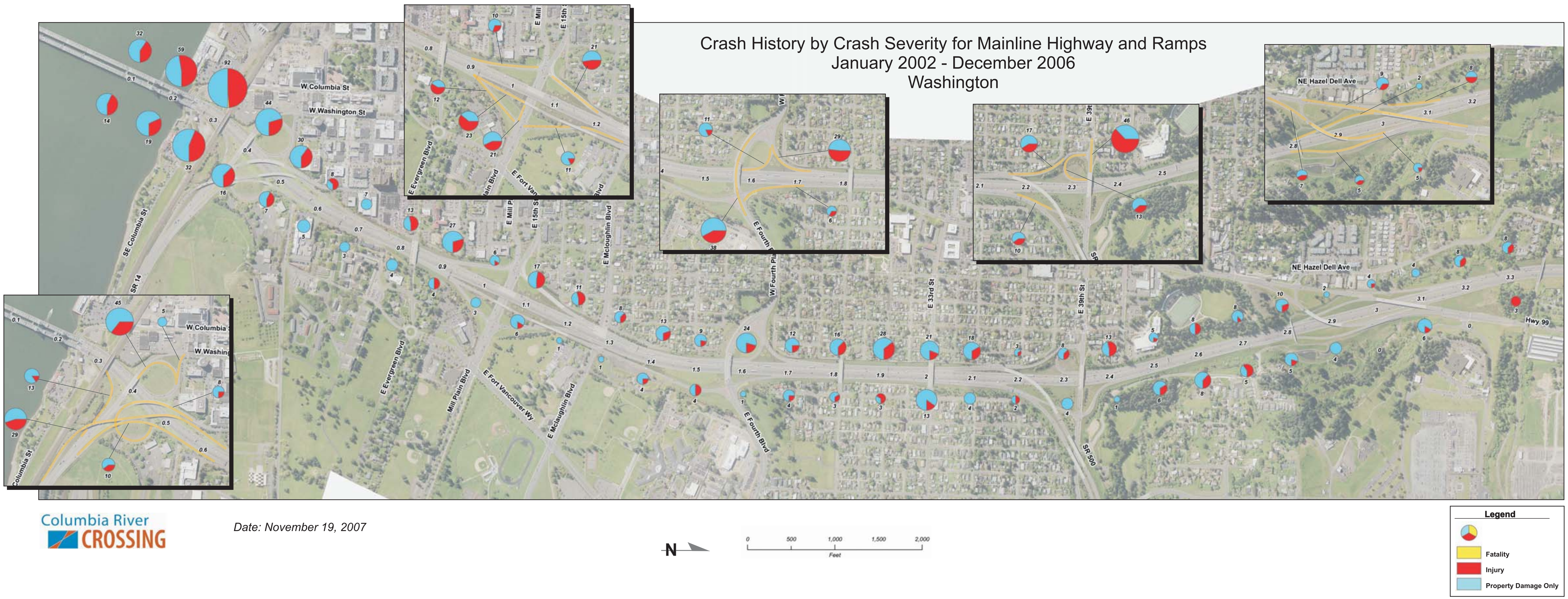
Crash History by Crash Type for Mainline Highway and Ramps
January 2002 - December 2006
Washington
Columbia River CROSSING
Date: November 19, 2007
N
0 500 1,000 1,500 2,000
Feet
Legend
Rear End
Side Swipe
Fixed Object
Other
W Columbia St
W Washington St
SE Columbia St
SR 14
E Evergreen Blvd
Mill Plain Blvd
E Mill Plain Blvd
E 15th St
E Fort Vancouver Wy
E Mcloughlin Blvd
W Fourth Plain Blvd
E Fourth Plain Blvd
E 33rd St
E 39th St
SR 500
NE Hazel Dell Ave
Hwy 99

Exhibit 5-36



Crash History by Crash Type for Mainline Highway and Ramps
January 2002 - December 2006
Oregon
N Denver Ave
N Interstate Ave
N Columbia Blvd
N Lombard St
N Marine Dr
N Union Ct
Martin Luther King Blvd
Columbia River CROSSING
Date: November 19, 2007
N
0 500 1,000 1,500 2,000
Feet
Legend
Rear End
Side Swipe
Fixed Object
Other

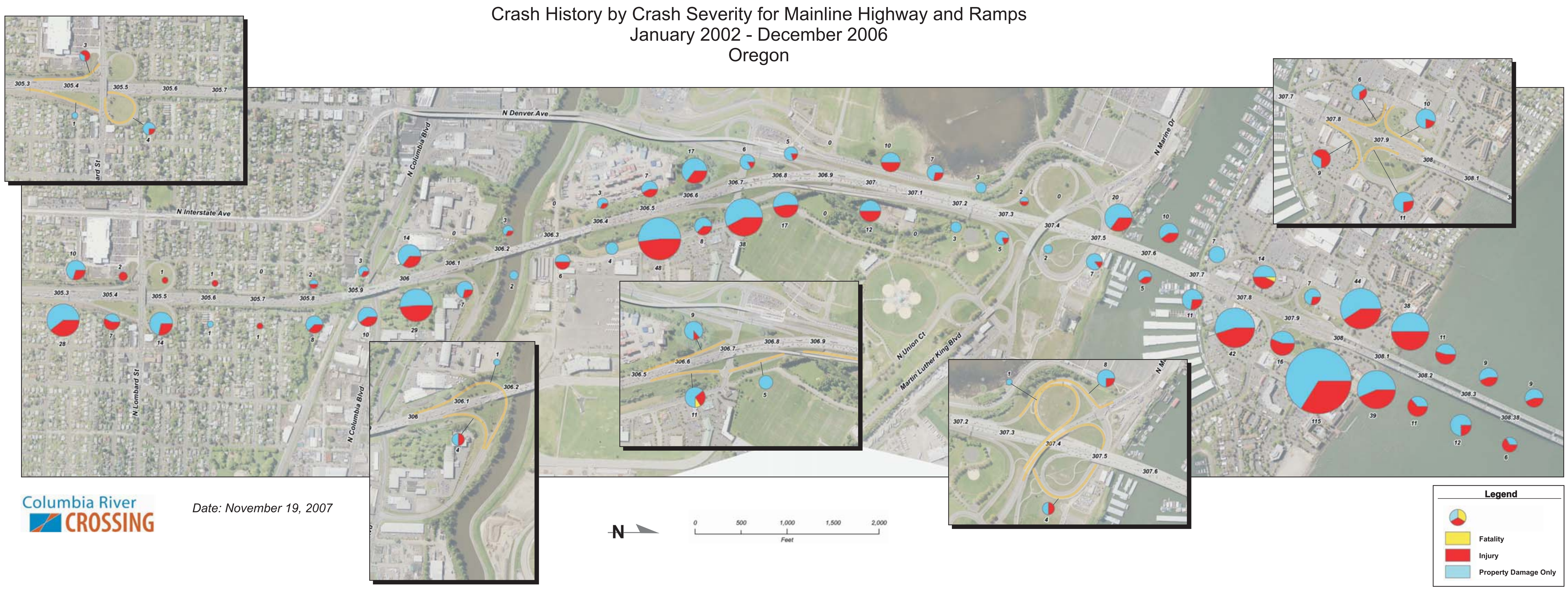
Exhibit 5-37



Columbia River CROSSING

Date: November 19, 2007

Exhibit 5-38



Crash History by Crash Severity for Mainline Highway and Ramps
January 2002 - December 2006
Oregon
N Denver Ave
N Interstate Ave
N Columbia Blvd
N Lombard St
N Marine Dr
N Union Ct
Martin Luther King Blvd
Columbia River CROSSING
Date: November 19, 2007
N
0
500
1,000
1,500
2,000
Feet
Legend
Fatality
Injury
Property Damage Only

Exhibit 5-39

#	State	Milepost Location	Direction	Description	Existing Dimension (ft)	Minimum Dimension (ft)	% of standard
Ramp-to-highway acceleration lane length							
1	WA	1.62	SB	Fourth Plain Blvd to I-5	1,250	1,420	88%
2	WA	0.47	SB	SR 14 WB to I-5	450	1,020	44%
3	OR	307.97	NB	Hayden Island on-ramp	211	2,201	10%
4	OR	307.76	SB	Hayden Island on-ramp	367	1,420	26%
5	OR	307.49	NB	Marine Drive on-ramp	367	1,420	26%
6	OR	306.51	SB	Victory Blvd on-ramp	437	750	58%
Highway-to-ramp deceleration lane length							
7	WA	0.39	NB	I-5 to 7th St/Downtown	385	460	84%
8	WA	0.28	NB	I-5 to SR 14 EB	170	430	40%
9	OR	307.99	SB	Hayden Island off-ramp	447	660	68%
10	OR	307.77	NB	Hayden Island off-ramp	289	520	56%
11	OR	307.47	SB	Marine Drive off-ramp	637	1,229	52%
Ramp-to-ramp separation length							
12	WA	0.30	NB	I-5 to SR 14 EB to I-5 to 7th St/Downtown	633	1,000	63%
Turning roadway - ramp merge							
13	WA	2.12	NB	I-5 39th St off-ramp to SR 500 off-ramp	528	800	66%
14	WA	0.87	NB	I-5 Mill Plain off-ramp to 4th Plain off-ramp	53	600	9%
Turning roadway - ramp split							
15	WA	2.20	SB	I-5 39th St on-ramp to SR 500 on-ramp	370	800	46%
Highway vertical alignment							
16	WA	0.30-0.47	Both	I-5 mainline sag vertical curve	400	533	75%
17	WA	0.00-0.30	Both	I-5 mainline sag vertical curve	400	963	42%
18	Both	308.10 to 0.20	Both	I-5 Bridge crest vertical curve	531	3,796	14%
Highway weaving area lane length							
19	WA	1.72-2.02	SB	SR 500 on-ramp to 4th Plain off-ramp	1,901	2,000	95%
20	WA	0.66-0.95	SB	Mill Plain on-ramp to SR 14 East	1,267	2,000	63%
21	OR	307.50-307.78	SB	Hayden Island on-ramp to Marine Drive off-ramp	1,855	2,000	93%
22	OR	307.49-307.76	NB	Marine Drive on-ramp to Hayden Island off-ramp	1,820	2,000	91%
23	OR	306-93-307.19	SB	Marine Drive on-ramp to Denver off-ramp	1,245	2,000	62%
Highway shoulder width							
24	WA	0.00-0.38	Both	inside and outside shoulders	0.5-6	10	5-60%
25	OR	307.90-308.38	NB	outside shoulder	0.5-2	12	4-17%
26	OR	307.86-308.38	SB	inside and outside shoulders	0.5-9.5	12	4-79%
27	OR	307.69-308.38	NB	inside shoulder	0.5-9.5	12	4-79%
28	OR	307.31-307.74	SB	inside and outside shoulders	0.5-6	12	4-50%
29	OR	307.03-307.29	NB	outside shoulder	1-4	12	8-33%
30	OR	306.59-307.45	NB	inside shoulder	0.5-6	12	4-50%
31	OR	305.22-307.31	SB	inside shoulder	0.5-6	12	4-50%
32	OR	305.82-306.65	SB	outside shoulder	0.5-9.5	12	4-79%
33	OR	306.54-306.59	NB	inside shoulder	0.5	12	4%
34	OR	306.10-306.53	NB	inside and outside shoulders	0.5-4	12	4-33%
35	OR	306.04-306.09	NB	outside shoulder	0.5-6	12	4-50%
36	OR	305.84-306.04	NB	inside shoulder	0.5	12	4%
37	OR	305.69-305.84	NB	outside shoulder taper	0.5-10	12	4-83%
38	OR	305.69-305.84	NB	inside shoulder taper	0.5-2	12	4-17%
39	OR	305.22-305.78	Both	Inside shoulder	2	12	17%
40	OR	305.22-305.47	SB	outside shoulder	1-4	12	8-33%

Table title: **Identified Deficiencies in Highway Geometrics**

Exhibit 5-40

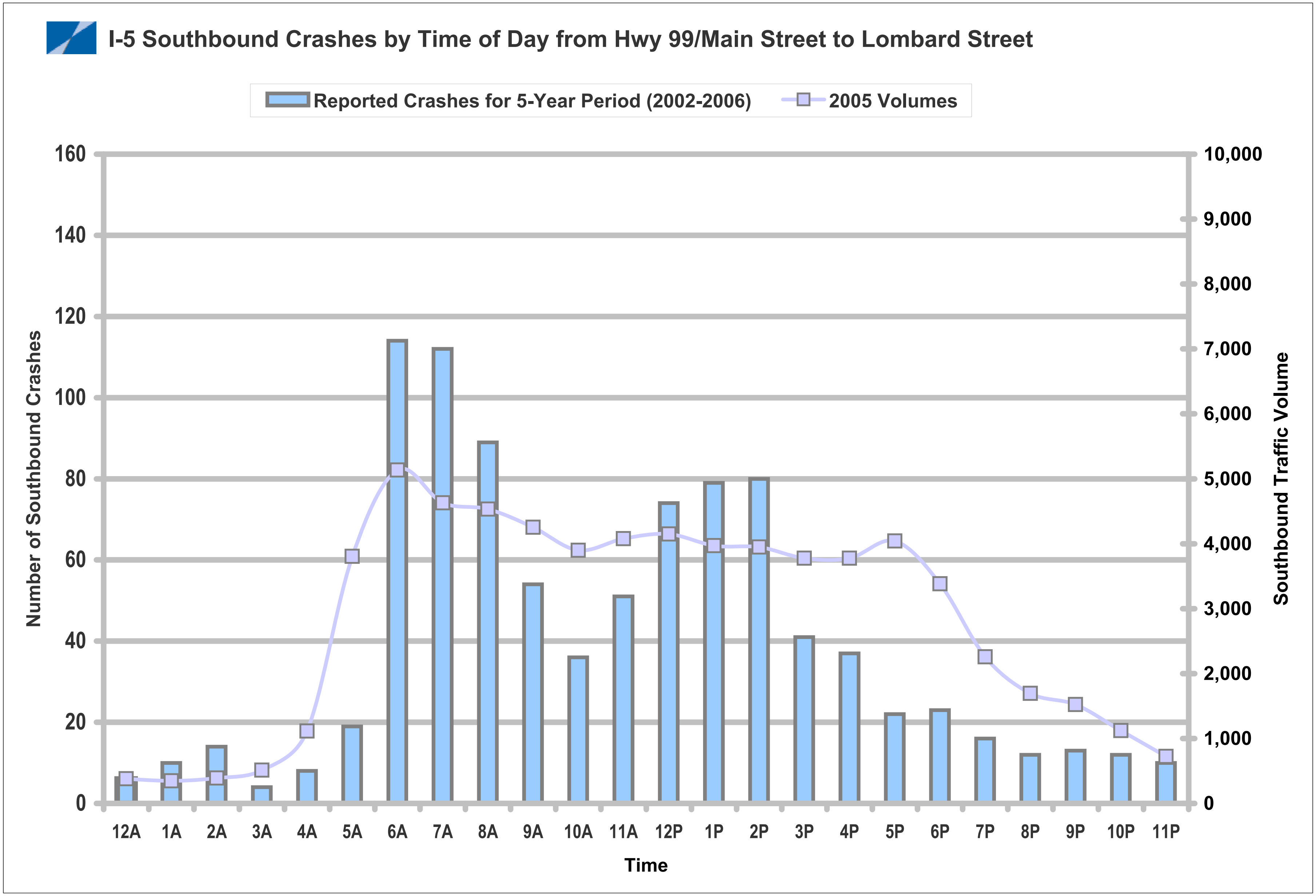
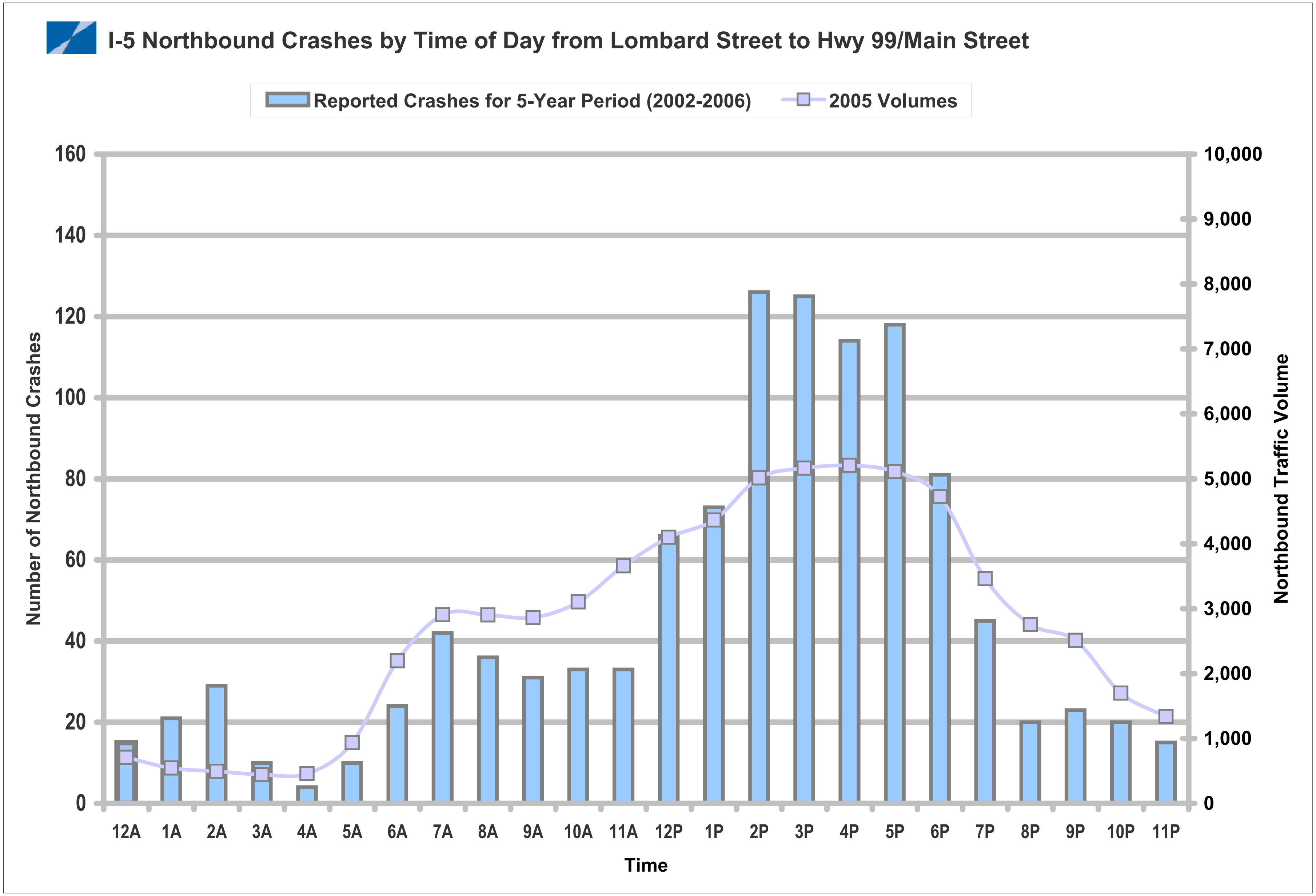

I-5 Southbound Crashes by Time of Day from Hwy 99/Main Street to Lombard Street
Reported Crashes for 5-Year Period (2002-2006)
2005 Volumes
Number of Southbound Crashes
0
20
40
60
80
100
120
140
160
Southbound Traffic Volume
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
9,000
10,000
12A
1A
2A
3A
4A
5A
6A
7A
8A
9A
10A
11A
12P
1P
2P
3P
4P
5P
6P
7P
8P
9P
10P
11P
Time

Exhibit 5-41



I-5 Northbound Crashes by Time of Day from Lombard Street to Hwy 99/Main Street
Reported Crashes for 5-Year Period (2002-2006)
2005 Volumes
Number of Northbound Crashes
Northbound Traffic Volume
Time
0
20
40
60
80
100
120
140
160
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
9,000
10,000
12A
1A
2A
3A
4A
5A
6A
7A
8A
9A
10A
11A
12P
1P
2P
3P
4P
5P
6P
7P
8P
9P
10P
11P

Exhibit 5-42

ODOT SPIS Locations 2006-2008				
Location	**Mileposts**	**Number of Crashes**	**2009 SPIS Index**	**SPIS Rank**
Columbia Boulevard interchange	305.90 to 306.09	29	69.48	top 5%
Hayden Island interchange	307.72 to 307.82	24	48.92	top 10%
Hayden Island interchange	307.81 to 307.90	12	53.25	top 10%
Hayden Island interchange	307.87 to 308.09	62	74.99	top 5%
Interstate Bridge bridgehead	308.06 to 308.17	16	46.60	top 10%
Interstate Bridge	308.10 to 308.19	17	47.12	top 10%
Interstate Bridge	308.28 to 308.38	19	49.64	top 10%

Source: Oregon Department of Transportation, 2009 Top 10% SPIS Groups for Region 1

Exhibit 5-43

Truck Collision Summary on I-5 from Lombard Street to Main Street/SR 99 (Jan. 1, 2002 - Dec. 31, 2006)							
Direction	Number of Fatalities	Number of Injuries	Collision Type				Number of Collisions
			Rear-end	Sideswipe	Fixed Object	Other	
Northbound	0	28	39	33	4	20	96
Southbound	1	49	69	67	4	19	159
Total	**1**	**77**	**108**	**100**	**8**	**39**	**255**
% of Total	0.4%	30%	42%	39%	3%	15%	

Source: *Crash Analysis Study Summary Working Paper*, Draft, 2007 CRC Project

Exhibit 5-44

Vancouver North-South Screenlines - AM Peak Hour Volumes	
Screenline	**2005 Existing**
West of Franklin St	
Westbound Total	1,350
Eastbound Total	1,400
West of I-5	
Westbound Total	3,100
Eastbound Total	2,750
East of I-5	
Westbound Total	2,550
Eastbound Total	2,300

Vancouver East-West Screenlines - AM Peak Hour Volumes	
Screenline	**2005 Existing**
North of Evergreen Blvd	
Southbound Total	950
Northbound Total	800
North of 15th St	
Southbound Total	1,300
Northbound Total	450
North of 4th Plain Blvd	
Southbound Total	1,500
Northbound Total	350
North of 39th St	
Southbound Total	800
Northbound Total	250

Exhibit 5-45

Vancouver North-South Screenlines - PM Peak Hour Volumes	
Screenline	**2005 Existing**
West of Franklin St	
Westbound Total	1,550
Eastbound Total	1,750
West of I-5	
Westbound Total	2,900
Eastbound Total	4,200
East of I-5	
Westbound Total	2,550
Eastbound Total	4,050

Vancouver East-West Screenlines - PM Peak Hour Volumes	
Screenline	**2005 Existing**
North of Evergreen Blvd	
Southbound Total	950
Northbound Total	1,200
North of 15th St	
Southbound Total	850
Northbound Total	950
North of 4th Plain Blvd	
Southbound Total	600
Northbound Total	950
North of 39th St	
Southbound Total	500
Northbound Total	650

Exhibit 5-46

Portland North-South Screenlines - AM Peak Hour Volumes	
Screenline	**2005 Existing**
West of Interstate	
Westbound Total	3,050
Eastbound Total	2,500
East of I-5	
Westbound Total	2,700
Eastbound Total	2,100
East of MLK Jr Blvd	
Westbound Total	3,350
Eastbound Total	2,250

Portland East-West Screenlines - AM Peak Hour Volumes	
Screenline	**2005 Existing**
Columbia Slough	
Southbound Total	1,200
Northbound Total	950
North of Rosa Parks	
Southbound Total	1,100
Northbound Total	600
South of Alberta St	
Southbound Total	1,600
Northbound Total	700

Exhibit 5-47

Portland North-South Screenlines - PM Peak Hour Volumes	
Screenline	**2005 Existing**
West of Interstate	
Westbound Total	2,350
Eastbound Total	3,450
East of I-5	
Westbound Total	2,600
Eastbound Total	2,950
East of MLK Jr Blvd	
Westbound Total	2,650
Eastbound Total	3,350

Portland East-West Screenlines - PM Peak Hour Volumes	
Screenline	**2005 Existing**
Columbia Slough	
Southbound Total	1,200
Northbound Total	1,350
North of Rosa Parks	
Southbound Total	1,100
Northbound Total	1,600
South of Alberta St	
Southbound Total	1,250
Northbound Total	2,100

Exhibit 5-48

24th St
E Fourth Plain Blvd
Lincoln
Columbia
Washington
Main
Broadway
C St
F St
W McLoughlin Blvd
Waterworks Park
20th St
WASHINGTON
501
W Mill Plain Blvd
15th
13th
Marshall Community Park
Fort Vancouver Way
E McLoughlin Blvd
Port
E Mill Plain Blvd
Evergreen Blvd
E Evergreen Blvd
E Reserve St
8th St
BNSF Rail
6th St
Esther Short
Fort Vancouver National Historic Site
Grand Blvd
SR 14
Vancouver
5thSt
Pearson Field
Columbia River
14
SE Columbia Way
Principal Arterial
Minor Arterial
Collector

Exhibit 5-49

Vancouver Intersection Performance Results

AM Peak Hour		2005 Existing Conditions							
#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)
01	3rd/4th St. @ Columbia St[3]	Westbound Left/Right	3.7	A	0.03	LOS E	Y	-	-
02	4th St. @ Columbia St.	Eastbound Left/Thru/Right	4.4	A	0.03	LOS E	Y	-	-
03	4th St. @ Washington St.	Eastbound Right	1.1	A	0.01	LOS E	Y	-	-
04	5th St. @ Columbia St.	Southbound Left	12.6	B	0.15	LOS E	Y	90	100 (SBL)
05	5th St. @ Washington St.	***Overall Intersection***	39.6	D	0.42	LOS E	Y	180	200 (EBR to I-5)
								215	225 (SBL)
06	6th St. @ Columbia St.	***Overall Intersection***	7.8	A	0.42	LOS E	Y	-	-
07	6th St. @ Washington St.	***Overall Intersection***	20.3	C	0.39	LOS E	Y	-	-
08	6th St. @ Main St.	***Overall Intersection***	6.5	A	0.38	LOS E	Y	-	-
09	6th St. @ Broadway	Southbound Right	1.8	A	0.02	LOS E	Y	-	-
10	6th St. @ C St.	Northbound Left/Thru	5.7	A	-	LOS E	Y	-	-
11	8th St. @ Esther St.	Southbound Left/Thru/Right	6.0	A	0.08	LOS E	Y	-	-
12	8th St. @ Columbia St.	***Overall Intersection***	10.8	B	0.51	LOS E	Y	-	-
13	8th St. @ Washington St.	***Overall Intersection***	5.4	A	0.55	LOS E	Y	-	-
14	8th St. @ Main St.	***Overall Intersection***	11.3	B	0.55	LOS E	Y	-	-
15	8th St. @ Broadway	Southbound Left	6.6	A	0.22	LOS E	Y	-	-
16	8th St. @ C St.	***Overall Intersection***	10.0	A	0.48	LOS E	Y	-	-
17	9th St. @ Esther St.	Westbound Left/Thru/Right	5.6	A	0.08	LOS E	Y	-	-
18	9th St. @ Columbia St.	Eastbound Left/Thru/Right	5.4	A	0.05	LOS E	Y	-	-
19	9th St. @ Washington St.	Westbound Left	6.4	A	0.01	LOS E	Y	-	-
20	9th St. @ Main St.	Northbound Left	6.2	A	0.05	LOS E	Y	50	75 (NBL)
21	9th St. @ Broadway	Southbound Thru/Right	5.6	A	0.27	LOS E	Y	-	-
22	Evergreen Blvd. @ Esther St.	Northbound Left/Thru/Right	4.7	A	0.12	LOS E	Y	-	-
23	Evergreen Blvd. @ Columbia St.	***Overall Intersection***	13.4	B	0.49	LOS E	Y	-	-
24	Evergreen Blvd. @ Washington St.	***Overall Intersection***	9.1	A	0.53	LOS E	Y	-	-
25	Evergreen Blvd. @ Main St.	***Overall Intersection***	7.9	A	0.53	LOS E	Y	-	-
26	Evergreen Blvd. @ Broadway	***Overall Intersection***	18.7	B	0.83	LOS E	Y	75	75 (WBL)
								100	100 (SBL)
								210	225 (SBTR)
27	Evergreen Blvd. @ C St.	***Overall Intersection***	11.9	B	0.83	LOS E	Y	-	-
28	11th St. @ Esther St.	Southbound Left/Thru/Right	4.3	A	0.03	LOS E	Y	-	-
29	11th St. @ Columbia St.	Westbound Left/Thru/Right	6.9	A	0.14	LOS E	Y	-	-
30	11th St. @ Washington St.	Eastbound Thru/Right	6.0	A	0.07	LOS E	Y	-	-
31	11th St. @ Main St.	Eastbound Thru/Right	4.7	A	0.08	LOS E	Y	-	-
32	11th St. @ Broadway	Eastbound Thru/Right	6.1	A	0.06	LOS E	Y	-	-
33	11th St. @ C St.	Eastbound Left/Thru	4.2	A	0.08	LOS E	Y	-	-
34	Mill Plain Blvd. @ Columbia St.	***Overall Intersection***	12.8	B	0.66	LOS E	Y	-	-
35	Mill Plain Blvd. @ Washington St.	***Overall Intersection***	7.2	A	0.40	LOS E	Y	-	-
36	Mill Plain Blvd. @ Main St.	***Overall Intersection***	4.7	A	0.57	LOS E	Y	-	-
37	Mill Plain Blvd. @ Broadway	***Overall Intersection***	12.2	B	0.51	LOS E	Y	190	200 (SBLT)
38	Mill Plain Blvd. @ C St.	***Overall Intersection***	8.3	A	0.34	LOS E	Y	-	-
39	Mill Plain Blvd. @ I-5 SB On-/Off-Ramps	***Overall Intersection***	18.6	B	0.58	LOS E	Y	350	375 (EBR)
								275	350 (WBL)
40	Mill Plain Blvd. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	21.8	C	0.54	LOS E	Y	75	100 (WBR)
41	15th St. @ Columbia St.	***Overall Intersection***	10.1	B	0.53	LOS E	Y	-	-
42	15th St. @ Washington St.	***Overall Intersection***	4.9	A	0.44	LOS E	Y	-	-
43	15th St. @ Main St.	***Overall Intersection***	7.5	A	0.48	LOS E	Y	-	-
44	15th St. @ Broadway	***Overall Intersection***	18.2	B	0.47	LOS E	Y	-	-
45	15th St. @ C St.	***Overall Intersection***	8.8	A	0.48	LOS E	Y	-	-
46	McLoughlin Blvd. @ Columbia St.	***Overall Intersection***	7.3	A	0.52	LOS E	Y	-	-
47	McLoughlin Blvd. @ Main St.	***Overall Intersection***	11.0	B	0.55	LOS E	Y	-	-
48	McLoughlin Blvd. @ Broadway	***Overall Intersection***	10.1	B	0.46	LOS E	Y	-	-
49	McLoughlin Blvd. @ Fort Vancouver Way	***Overall Intersection***	9.1	A	0.36	LOS D	Y	-	-
50	24th St. @ Columbia St.	Westbound Left/Thru/Right	8.4	A	0.12	LOS E	Y	-	-
51	24th St. @ Main St.	Eastbound Left/Right	6.6	A	0.06	LOS E	Y	-	-
52	4th Plain Blvd. @ Columbia St.	***Overall Intersection***	18.8	B	0.61	LOS D	Y	-	-
53	4th Plain Blvd. @ Main St.	***Overall Intersection***	35.7	D	0.66	LOS D	Y	125	150 (WBL)
								200	200 (WBTR)
								75	100 (SBL)
								470	475 (SBTR)
54	4th Plain Blvd. @ Broadway	***Overall Intersection***	18.4	B	0.65	LOS D	Y	-	-
55	4th Plain Blvd. @ F St.	***Overall Intersection***	12.5	B	0.50	LOS D	Y	150	200 (EBL)
56	4th Plain Blvd. @ I-5 SB On-/Off-Ramps	***Overall Intersection***	8.8	A	0.46	LOS D	Y	-	-
57	4th Plain Blvd. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	12.3	B	0.51	LOS D	Y	75	150 (WBR)
58	4th Plain Blvd. @ Post Cemetery	Eastbound Left	6.5	A	0.01	LOS E	Y	-	-
59	4th Plain Blvd. @ St. Johns Blvd.	***Overall Intersection***	13.2	B	0.41	LOS D	Y	-	-
60	28th St. @ Main St.	Eastbound Left/Thru/Right	> 100	F	0.07	LOS E	N	215	225 (SBTR)
61	28th St. @ Broadway	Northbound Thru/Right	1.0	A	-	LOS E	Y	-	-
62	29th St. @ Main St./Broadway	Eastbound Left/Thru/Right	23.8	C	-	LOS E	Y	-	-
63	33rd St. @ Main St.	***Overall Intersection***	18.3	B	0.54	LOS D	Y	50	75 (WBL)
								75	100 (SBL)
64	39th St. @ Main St.	***Overall Intersection***	28.5	C	0.69	LOS D	Y	75	125 (EBL)
								75	125 (WBL)
								215	225 (WBTR)
								125	175 (SBL)
65	39th St. @ F St.	Southbound Left/Thru/Right	22.6	C	0.12	LOS E	Y	50	75 (WBL)
66	39th St. @ H St.	***Overall Intersection***	8.2	A	0.54	LOS D	Y	135	150 (WBTR)
67	39th St. @ I-5 SB On-/Off-Ramps	Northbound Left	68.0	F	1.55	LOS E	N	1660	600 (NBL)
								125	200 (NBR)
68	39th St. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	11.9	B	0.59	LOS D	Y	-	-
69	WSDOT/40th St. @ Main St.	***Overall Intersection***	4.5	A	0.44	LOS D	Y	-	-
70	45th St. @ Main St.	***Overall Intersection***	7.4	A	0.44	LOS D	Y	-	-
71	Hazel Dell @ Main St. (West)	***Overall Intersection***	9.7	A	0.50	LOS D	Y	-	-
72	Ross St. @ Main St.	***Overall Intersection***	4.6	A	0.29	LOS D	Y	-	-
73	Ross St. @ North Rd.	Northbound Left/Thru	6.0	A	0.24	LOS E	Y	-	-

	Delay / LOS affected by freeway congestion
	Intersection queuing spills back into upstream intersection
Note 1	The ICU is used for overall intersections (signalized and unsignalized). The V/C is used for the identified movement(s) at unsignalized intersections.
Note 2	The 2003 Vancouver Concurrency Administration Manual designates an acceptable LOS standard of LOS E for downtown and LOS D for all other intersections.
Note 3	2030 LPA and LPA Phase I Roundabout intersection operations taken from VISSIM analysis
*	Intersection not modeled in existing conditions scenario
Y*	Intersection does not meet standard in the Build scenario, but meets the "do no worse" criteria as compared to the No Build.
Y**	Intersection operations are no worse than No Build, and no mitigation is required.

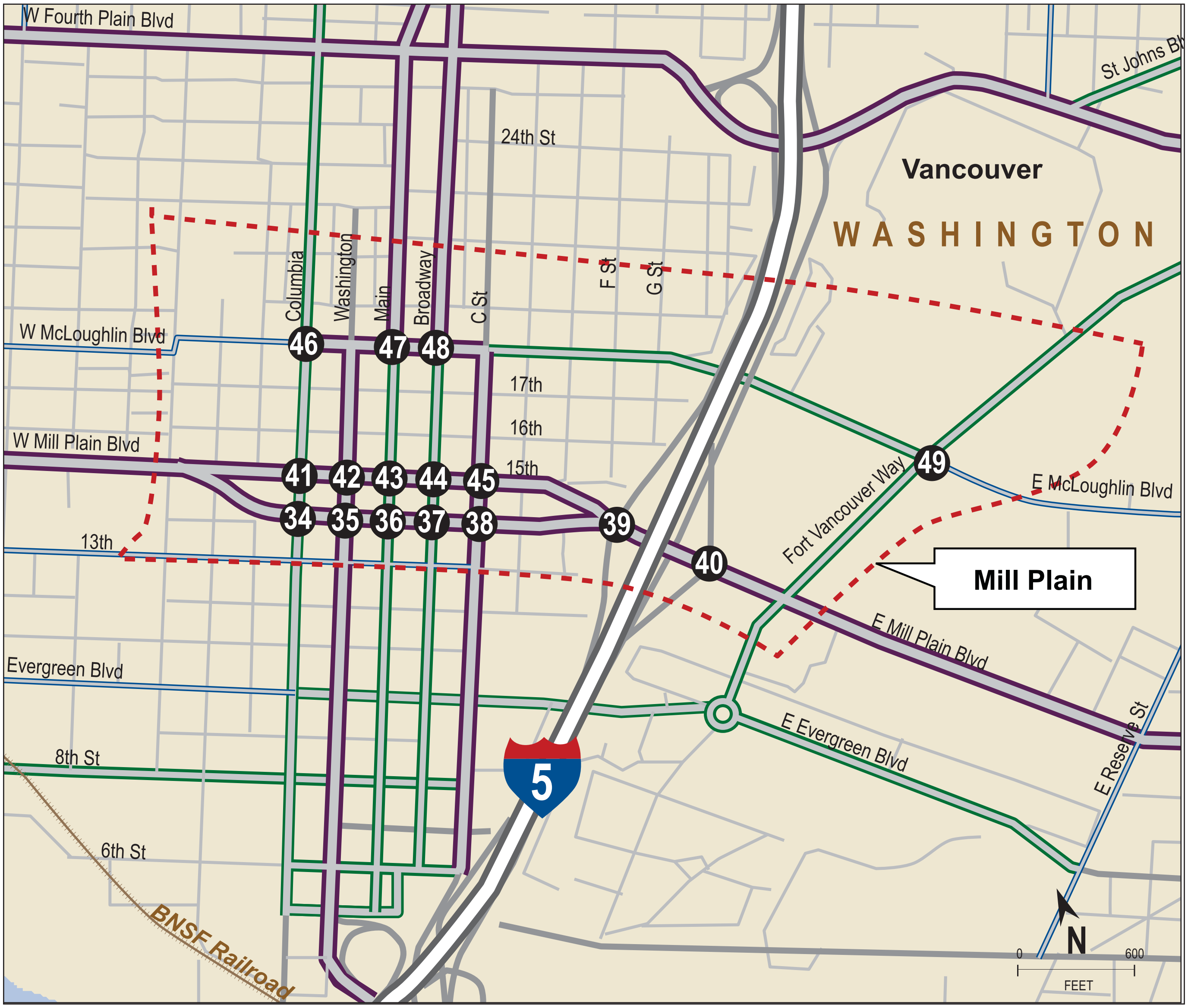
Exhibit 5-50

Vancouver Intersection Performance Results

PM Peak Hour		2005 Existing Conditions							
#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)
01	3rd/4th St. @ Columbia St[3]	Westbound Left/Right	4.7	A	0.05	LOS E	Y	-	-
02	4th St. @ Columbia St.	Westbound Left/Thru/Right	4.8	A	0.05	LOS E	Y	-	-
03	4th St. @ Washington St.	Eastbound Right	1.6	A	0.01	LOS E	Y	-	-
04	5th St. @ Columbia St.	Southbound Left	3.6	A	0.22	LOS E	Y	-	-
05	5th St. @ Washington St.	***Overall Intersection***	8.1	A	0.34	LOS E	Y	-	-
06	6th St. @ Columbia St.	***Overall Intersection***	10.7	B	0.42	LOS E	Y	-	-
07	6th St. @ Washington St.	***Overall Intersection***	11.6	B	0.36	LOS E	Y	-	-
08	6th St. @ Main St.	***Overall Intersection***	5.3	A	0.43	LOS E	Y	-	-
09	6th St. @ Broadway	Southbound Right	4.6	A	0.22	LOS E	Y	-	-
10	6th St. @ C St.	Northbound Left/Thru	2.1	A	-	LOS E	Y	-	-
11	8th St. @ Esther St.	Northbound Left/Thru/Right	8.0	A	0.31	LOS E	Y	-	-
12	8th St. @ Columbia St.	***Overall Intersection***	15.1	B	0.74	LOS E	Y	-	-
13	8th St. @ Washington St.	***Overall Intersection***	9.5	A	0.58	LOS E	Y	75	125 (WBL)
14	8th St. @ Main St.	***Overall Intersection***	17.0	B	0.58	LOS E	Y	-	-
15	8th St. @ Broadway	Southbound Thru/Right	10.2	B	0.13	LOS E	Y	-	-
16	8th St. @ C St.	***Overall Intersection***	14.3	B	0.34	LOS E	Y	-	-
17	9th St. @ Esther St.	Westbound Left/Thru/Right	4.5	A	0.07	LOS E	Y	-	-
18	9th St. @ Columbia St.	Westbound Left/Thru/Right	6.3	A	0.18	LOS E	Y	-	-
19	9th St. @ Washington St.	Westbound Thru	8.5	A	0.08	LOS E	Y	-	-
20	9th St. @ Main St.	Northbound Thru	6.7	A	0.34	LOS E	Y	50	50 (NBL)
21	9th St. @ Broadway	Southbound Thru/Right	6.2	A	0.24	LOS E	Y	-	-
22	Evergreen Blvd. @ Esther St.	Southbound Left/Thru/Right	6.6	A	0.14	LOS E	Y	-	-
23	Evergreen Blvd. @ Columbia St.	***Overall Intersection***	10.9	B	0.53	LOS E	Y	-	-
24	Evergreen Blvd. @ Washington St.	***Overall Intersection***	10.5	B	0.56	LOS E	Y	-	-
25	Evergreen Blvd. @ Main St.	***Overall Intersection***	9.7	A	0.56	LOS E	Y	-	-
26	Evergreen Blvd. @ Broadway	***Overall Intersection***	12.7	B	0.56	LOS E	Y	210	225 (SBTR)
27	Evergreen Blvd. @ C St.	***Overall Intersection***	13.0	B	0.56	LOS E	Y	-	-
28	11th St. @ Esther St.	Northbound Left/Thru/Right	6.3	A	0.11	LOS E	Y	-	-
29	11th St. @ Columbia St.	Eastbound Left/Thru/Right	8.9	A	0.34	LOS E	Y	-	-
30	11th St. @ Washington St.	Eastbound Thru/Right	7.0	A	0.21	LOS E	Y	-	-
31	11th St. @ Main St.	Eastbound Thru/Right	7.5	A	0.41	LOS E	Y	-	-
32	11th St. @ Broadway	Eastbound Thru/Right	6.2	A	0.19	LOS E	Y	-	-
33	11th St. @ C St.	Eastbound Left/Thru	7.8	A	0.18	LOS E	Y	-	-
34	Mill Plain Blvd. @ Columbia St.	***Overall Intersection***	14.7	B	0.75	LOS E	Y	-	-
35	Mill Plain Blvd. @ Washington St.	***Overall Intersection***	8.2	A	0.45	LOS E	Y	-	-
36	Mill Plain Blvd. @ Main St.	***Overall Intersection***	12.4	B	0.62	LOS E	Y	100	150 (NBR)
37	Mill Plain Blvd. @ Broadway	***Overall Intersection***	16.6	B	0.70	LOS E	Y	-	-
38	Mill Plain Blvd. @ C St.	***Overall Intersection***	14.1	B	0.60	LOS E	Y	-	-
39	Mill Plain Blvd. @ I-5 SB On-/Off-Ramps	***Overall Intersection***	37.5	D	0.72	LOS E	Y	275	350 (WBL)
40	Mill Plain Blvd. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	26.8	C	0.86	LOS E	Y	610	725 (EBL)
								610	625 (EBT)
								75	125 (WBR)
41	15th St. @ Columbia St.	***Overall Intersection***	9.0	A	0.54	LOS E	Y	-	-
42	15th St. @ Washington St.	***Overall Intersection***	5.6	A	0.37	LOS E	Y	-	-
43	15th St. @ Main St.	***Overall Intersection***	9.0	A	0.59	LOS E	Y	-	-
44	15th St. @ Broadway	***Overall Intersection***	24.8	C	0.43	LOS E	Y	210	250 (WBL)
45	15th St. @ C St.	***Overall Intersection***	6.7	A	0.41	LOS E	Y	-	-
46	McLoughlin Blvd. @ Columbia St.	***Overall Intersection***	6.4	A	0.42	LOS E	Y	-	-
47	McLoughlin Blvd. @ Main St.	***Overall Intersection***	11.6	B	0.67	LOS E	Y	-	-
48	McLoughlin Blvd. @ Broadway	***Overall Intersection***	7.8	A	0.39	LOS E	Y	-	-
49	McLoughlin Blvd. @ Fort Vancouver Way	***Overall Intersection***	12.6	B	0.43	LOS D	Y	-	-
50	24th St. @ Columbia St.	Eastbound Left/Thru/Right	5.4	A	-	LOS E	Y	-	-
51	24th St. @ Main St.	Eastbound Left/Right	7.7	A	0.07	LOS E	Y	-	-
52	4th Plain Blvd. @ Columbia St.	***Overall Intersection***	15.8	B	0.50	LOS D	Y	-	-
53	4th Plain Blvd. @ Main St.	***Overall Intersection***	28.3	C	0.66	LOS D	Y	125	150 (WBL)
								200	200 (WBTR)
								75	100 (NBL)
								75	125 (NBR)
								75	125 (SBL)
54	4th Plain Blvd. @ Broadway	***Overall Intersection***	24.0	C	0.94	LOS D	Y	125	150 (WBL)
								495	500 (WBTR)
55	4th Plain Blvd. @ F St.	***Overall Intersection***	7.1	A	0.57	LOS D	Y	150	150 (EBT)
56	4th Plain Blvd. @ I-5 SB On-/Off-Ramps	***Overall Intersection***	11.3	B	0.54	LOS D	Y	-	-
57	4th Plain Blvd. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	16.0	B	0.63	LOS D	Y	75	150 (WBR)
58	4th Plain Blvd. @ Post Cemetery	Eastbound Left	7.0	A	-	LOS E	Y	-	-
59	4th Plain Blvd. @ St. Johns Blvd.	***Overall Intersection***	16.6	B	0.54	LOS D	Y	-	-
60	28th St. @ Main St.	Eastbound Left/Thru/Right	6.8	A	0.03	LOS E	Y	-	-
61	28th St. @ Broadway	Northbound Thru/Right	1.9	A	-	LOS E	Y	-	-
62	29th St. @ Main St./Broadway	Eastbound Left/Thru/Right	12.5	B	-	LOS E	Y	-	-
63	33rd St. @ Main St.	***Overall Intersection***	18.3	B	0.45	LOS D	Y	50	75 (EBL)
								50	75 (WBL)
64	39th St. @ Main St.	***Overall Intersection***	38.3	D	0.71	LOS D	Y	75	125 (EBL)
								490	500 (EBTR)
								75	100 (WBL)
								215	225 (WBTR)
								75	125 (NBL)
								125	175 (SBL)
65	39th St. @ F St.	Northbound Left/Thru/Right	> 100	F	0.16	LOS E	N	-	-
								50	75 (WBL)
								430	450 (WBTR)
66	39th St. @ H St.	***Overall Intersection***	8.3	A	0.57	LOS D	Y	135	150 (WBTR)
67	39th St. @ I-5 SB On-/Off-Ramps	Northbound Left	30.0	D	-	LOS E	Y	-	-
								55	100 (EBR)
								125	175 (NBR)
68	39th St. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	23.1	C	0.76	LOS D	Y	75	125 (NBR)
69	WSDOT/40th St. @ Main St.	***Overall Intersection***	4.9	A	0.33	LOS D	Y	-	-
70	45th St. @ Main St.	***Overall Intersection***	9.1	A	0.44	LOS D	Y	-	-
71	Hazel Dell @ Main St. (West)	***Overall Intersection***	8.5	A	0.45	LOS D	Y	-	-
72	Ross St. @ Main St.	***Overall Intersection***	8.5	A	0.46	LOS D	Y	60	75 (WBL)
								60	75 (WBR)
73	Ross St. @ North Rd.	Southbound Thru/Right	5.0	A	0.18	LOS E	Y	-	-

(yellow)	Delay / LOS affected by freeway congestion
(blue)	Intersection queuing spills back into upstream intersection
Note 1	The ICU is used for overall intersections (signalized and unsignalized). The V/C is used for the identified movement(s) at unsignalized intersections.
Note 2	The 2003 Vancouver Concurrency Administration Manual designates an acceptable LOS standard of LOS E for downtown and LOS D for all other intersectio
Note 3	2030 LPA and LPA Phase I Roundabout intersection operations taken from VISSIM analysis
*	Intersection not modeled in existing conditions scenario
Y*	Intersection does not meet standard in the Build scenario, but meets the "do no worse" criteria as compared to the No Build.
Y**	Intersection operations are no worse than No Build, and no mitigation is required.

Exhibit 5-51

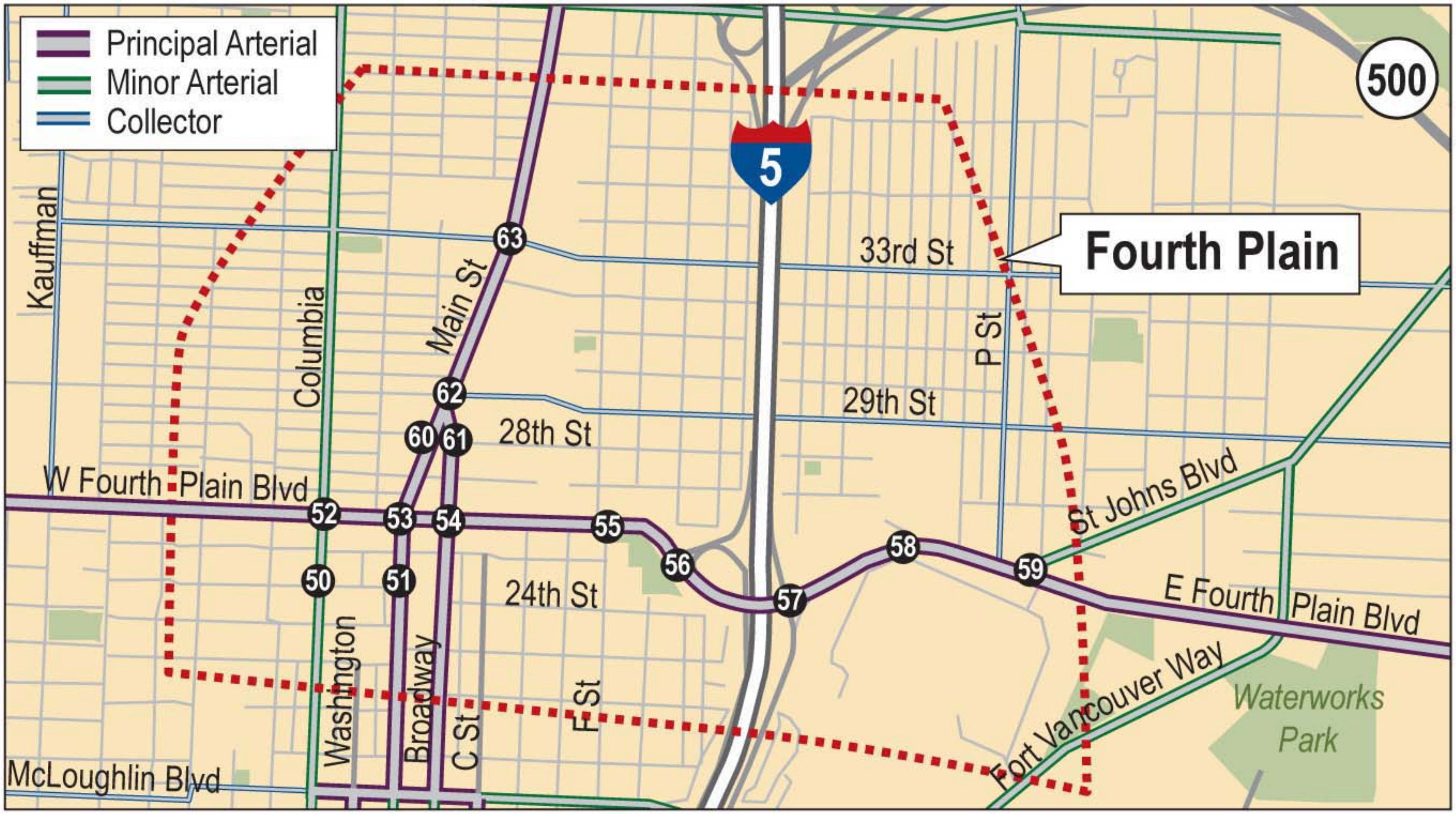


Principal Arterial	
Minor Arterial	
Collector	
1	Intersection Analyzed
Sub-areas	

Existing
Mill Plain Interchange Sub-area

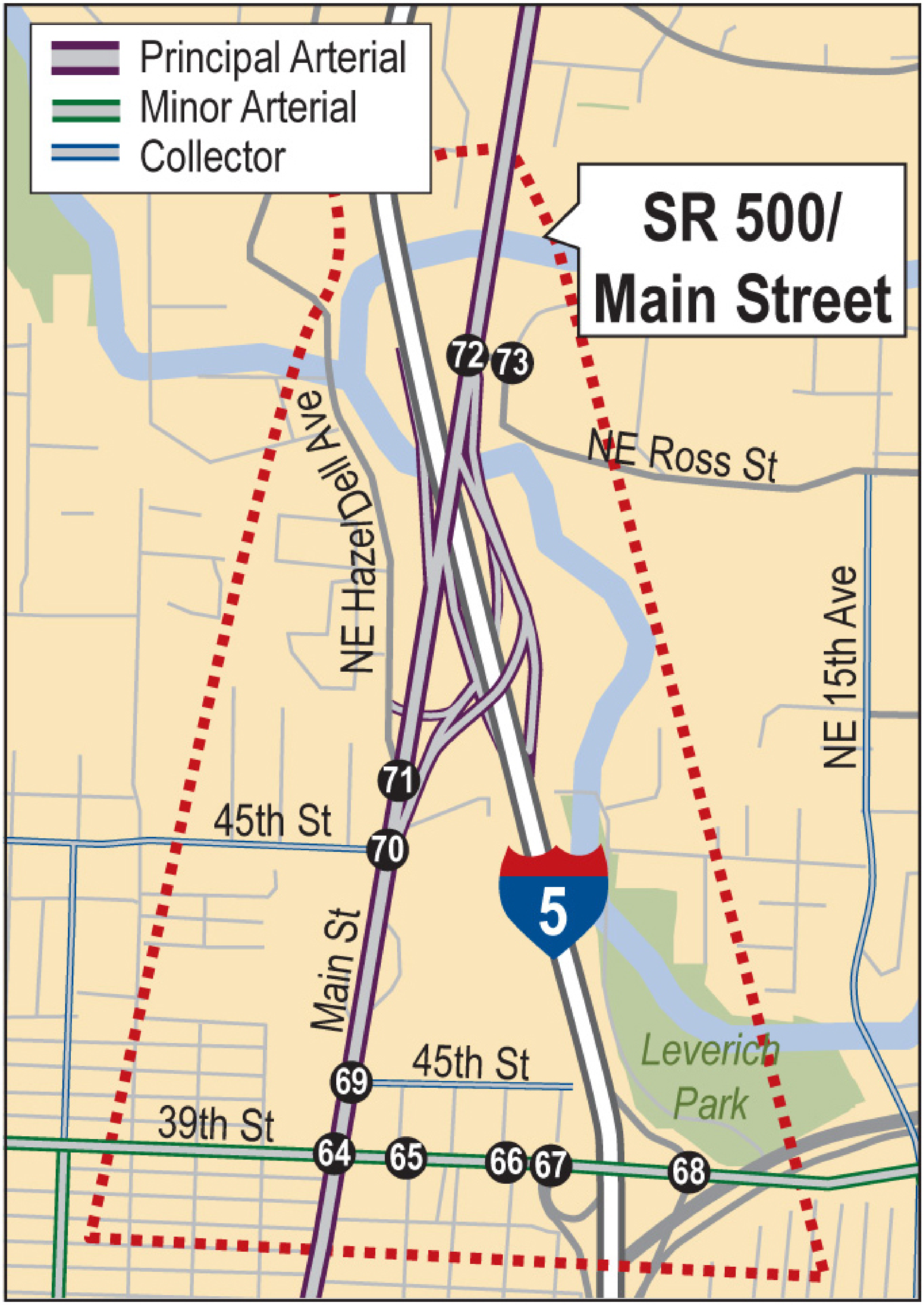
Columbia River CROSSING

Exhibit 5-52



Principal Arterial
Minor Arterial
Collector
500
5
Fourth Plain
Kauffman
Columbia
Main St
33rd St
P St
29th St
28th St
W Fourth Plain Blvd
St Johns Blvd
E Fourth Plain Blvd
24th St
Washington
Broadway
C St
F St
McLoughlin Blvd
Fort Vancouver Way
Waterworks Park
50
51
52
53
54
55
56
57
58
59
60
61
62
63

Exhibit 5-53



Principal Arterial
Minor Arterial
Collector
SR 500/
Main Street
NE Ross St
NE Hazel Dell Ave
NE 15th Ave
45th St
Main St
45th St
39th St
Leverich
Park
5
72
73
71
70
69
64
65
66
67
68

Exhibit 5-54


Hayden Island
N Hayden Island Dr
5
Columbia River
Hayden Island
24
25
N Marine Dr
OREGON
Principal Arterial
Minor Arterial
Urban Collector
Minor Collector

Exhibit 5-55

Portland Intersection Performance Results

AM Peak Hour		2005 Existing Conditions							
#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2,3,4]	Meets Standard	Storage Length	95% Queue (ft)
01	Fremont and MLK Jr.	***Overall Intersection***	24.2	C	0.83	LOS D	Y	125	200 (WBL)
02	Going and Interstate	***Overall Intersection***	31.7	C	0.75	LOS D	Y	125	250 (WBL)
								125	150 (NBL)
03	Alberta and Interstate	***Overall Intersection***	18.0	B	0.72	LOS D	Y	100	125 (SBL)
04	Alberta and SB I-5 Off-Ramp	***Overall Intersection***	13.6	B	0.67	0.85	Y	175	175 (WBLT)
05	Alberta and NB I-5 Off-Ramp	***Overall Intersection***	10.1	B	0.49	0.85	Y	-	-
06	Alberta and MLK Jr.	***Overall Intersection***	20.3	C	0.78	LOS D	Y	75	125 (WBR)
								100	125 (NBL)
07	Rosa Parks and Interstate	***Overall Intersection***	18.2	B	0.54	LOS D	Y	-	-
08	Rosa Parks and I-5 SB On-/Off Ramps	***Overall Intersection***	18.3	B	0.52	0.85	Y	190	225 (WBL)
09	Rosa Parks and I-5 NB On-/Off Ramps	***Overall Intersection***	11.8	B	0.39	0.85	Y	-	-
10	Rosa Parks and MLK Jr.	***Overall Intersection***	17.5	B	0.66	LOS D	Y	-	-
11	Lombard and Interstate	***Overall Intersection***	27.8	C	0.72	0.99	Y	150	175 (WBL)
12	Lombard and I-5 SB On-Ramps	Eastbound Thru/Right	4.8	A	0.31	0.85	Y	-	-
13	Lombard and I-5 NB Off-Ramps	Northbound Right	8.5	A	0.48	0.85	Y	-	-
14	Lombard and MLK Jr.	***Overall Intersection***	61.4	E	0.79	0.99	Y	100	125 (EBL)
								100	175 (WBL)
								100	175 (NBL)
								150	300 (SBL)
15	Interstate and Argyle	***Overall Intersection***	22.2	C	0.61	LOS D	Y	75	125 (EBR)
								50	75 (NBL)
16	Columbia Blvd and I-5 Ramps	***Overall Intersection***	17.6	B	0.62	0.85	Y	150	200 (WBR)
17	Columbia Blvd and MLK Jr.	***Overall Intersection***	32.7	C	0.72	0.99	Y	100	200 (NBL)
								225	250 (SBL)
18	Victory and Expo Road	***Overall Intersection***	2.2	A	0.22	LOS E	Y	-	-
19	Victory Blvd and I-5 SB On-Ramp	Westbound Left/Thru	1.1	A	0.17	0.85	Y	-	-
20	Victory Blvd and NB On-/Off-Ramps	***Overall Intersection***	4.0	A	0.10	0.85	Y	-	-
21	Union Ct and I-5 NB Off-Ramp	Eastbound Left	7.1	A	0.24	0.85	Y	-	-
22	Union Ct/Marine Way and Vancouver Way	***Overall Intersection***	5.8	A	0.36	LOS E	Y	-	-
23	Marine Dr and I-5 On-/Off-Ramps	***Overall Intersection***	32.8	C	0.66	0.85	Y	200	275 (NBL)
								125	200 (SBR)
24	Center Ave and I-5 SB On-/Off Ramps	***Overall Intersection***	11.0	B	0.35	0.85	Y	-	-
25	Hayden Island Dr and Hayden Island Dr South	***Overall Intersection***	8.2	A	0.35	0.85	Y	-	-

Delay / LOS affected by freeway congestion

Intersection queuing spills back into upstream intersection

Note 1 The ICU is used for signalized and AWSC intersections. The V/C is used for the critical movement at other intersections.

Note 2 The ODOT V/C standard of 0.85 is used for ramp terminals in the Existing and No-Build scenarios (Action 1F1)

Note 3 The ODOT V/C standard of 0.99 is used for ODOT-controlled intersections along Lombard Street (US-30) and MLK Jr. Boulevard (OR-99W), that are not ramp terminals, for the Existing, No-Build and LPA scenarios as stated in the OHP (Table 7, 2004 update).

Note 4 The PBOT operational standard for signalized intersections is LOS D and, for unsignalized intersections, is LOS E.

Exhibit 5-56

Portland Intersection Performance Results

PM Peak Hour		2005 Existing Conditions							
#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2,3,4]	Meets Standard	Storage Length	95% Queue (ft)
01	Fremont and MLK Jr.	***Overall Intersection***	30.5	C	0.89	LOS D	Y	125	150 (EBL)
								125	175 (NBL)
								125	150 (SBL)
02	Going and Interstate	***Overall Intersection***	33.8	C	0.72	LOS D	Y	125	150 (NBL)
03	Alberta and Interstate	***Overall Intersection***	25.1	C	0.76	LOS D	Y	125	175 (NBL)
04	Alberta and SB I-5 Off-Ramp	***Overall Intersection***	10.4	B	0.63	0.85	Y	-	-
05	Alberta and NB I-5 Off-Ramp	***Overall Intersection***	10.1	B	0.70	0.85	Y	-	-
06	Alberta and MLK Jr.	***Overall Intersection***	38.0	D	0.88	LOS D	Y	75	150 (WBR)
								100	150 (NBL)
								100	150 (SBL)
07	Rosa Parks and Interstate	***Overall Intersection***	32.0	C	0.71	LOS D	Y	100	150 (WBL)
								175	225 (NBL)
08	Rosa Parks and I-5 SB On-/Off Ramps	***Overall Intersection***	15.0	B	0.48	0.85	Y	-	-
09	Rosa Parks and I-5 NB On-/Off Ramps	***Overall Intersection***	12.7	B	0.42	0.85	Y	-	-
10	Rosa Parks and MLK Jr.	***Overall Intersection***	16.5	B	0.75	LOS D	Y	100	150 (NBL)
11	Lombard and Interstate	***Overall Intersection***	32.4	C	0.76	0.99	Y	100	175 (NBR)
12	Lombard and I-5 SB On-Ramps	Eastbound Thru/Right	3.7	A	0.36	0.85	Y	-	-
13	Lombard and I-5 NB Off-Ramps	Northbound Right	10.7	B	0.42	0.85	Y	-	-
14	Lombard and MLK Jr.	***Overall Intersection***	74.0	E	0.85	0.99	Y	100	150 (EBL)
								100	175 (WBL)
								100	225 (NBL)
								150	300 (SBL)
15	Interstate and Argyle	***Overall Intersection***	17.6	B	0.61	LOS D	Y	75	125 (EBR)
								50	75 (NBL)
16	Columbia Blvd and I-5 Ramps	***Overall Intersection***	12.6	B	0.58	0.85	Y	150	175 (WBR)
17	Columbia Blvd and MLK Jr.	***Overall Intersection***	39.3	D	0.71	0.99	Y	150	175 (WBL)
								100	225 (NBL)
								225	300 (SBL)
18	Victory and Expo Road	***Overall Intersection***	4.4	A	0.32	LOS E	Y	-	-
19	Victory Blvd and I-5 SB On-Ramp	Eastbound Thru	5.5	A	0.27	0.85	Y	-	-
20	Victory Blvd and NB On-/Off-Ramps	***Overall Intersection***	56.9	E	0.32	0.85	Y	290	325 (EBL)
								200	250 (WBTR)
21	Union Ct and I-5 NB Off-Ramp	Eastbound Left/Thru	33.1	D	0.30	0.85	Y	200	250 (EBL)
22	Union Ct/Marine Way and Vancouver Way	***Overall Intersection***	28.3	D	0.66	LOS E	Y	75	100 (SBLTR)
								370	500 (NBLT)
								370	400 (NBR)
								55	75 (SWL)
								55	75 (SWTR)
23	Marine Dr and I-5 On-/Off-Ramps	***Overall Intersection***	55.7	E	0.69	0.85	Y	275	325 (EBL)
								375	1150 (WBR)
24	Center Ave and I-5 SB On-/Off Ramps	***Overall Intersection***	20.2	C	0.61	0.85	Y	115	225 (WBLT)
25	Hayden Island Dr and Hayden Island Dr South	***Overall Intersection***	12.9	B	0.44	0.85	Y	-	-

Delay / LOS affected by freeway congestion

Intersection queuing spills back into upstream intersection

Note 1 The ICU is used for signalized and AWSC intersections. The V/C is used for the critical movement at other intersections.

Note 2 The ODOT V/C standard of 0.85 is used for ramp terminals in the Existing and No-Build scenarios (Action 1F1)

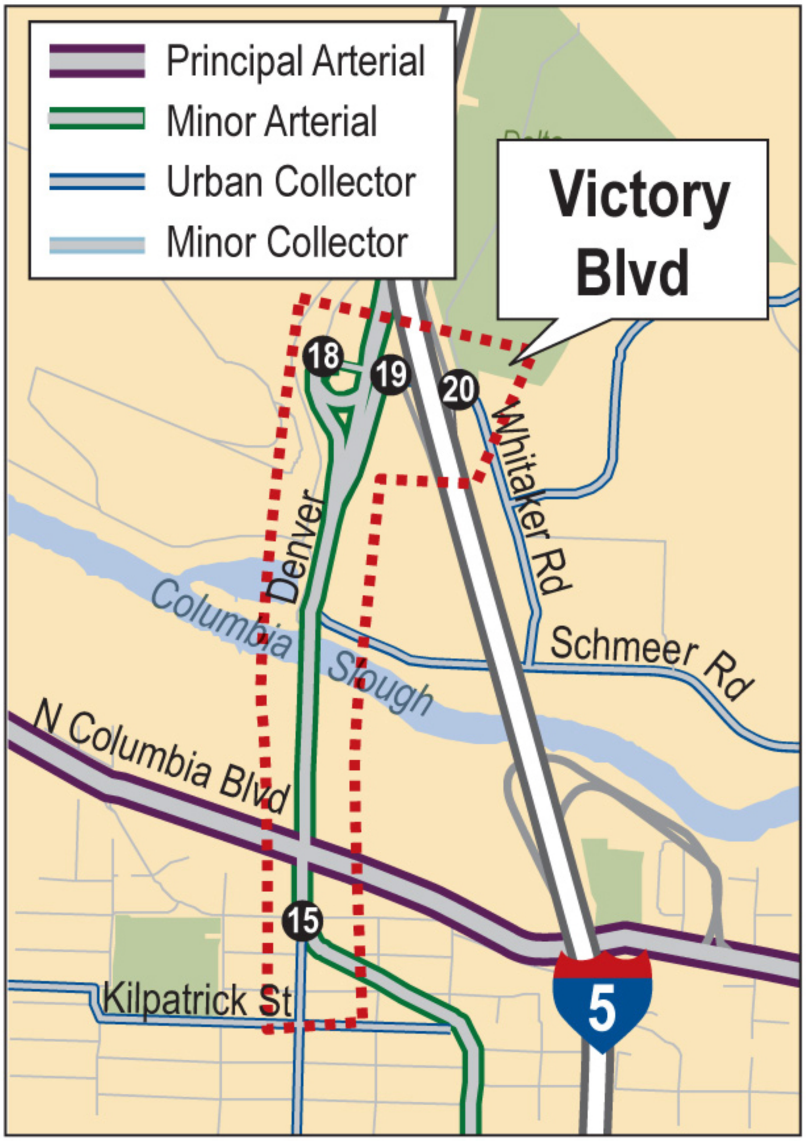
Note 3 The ODOT V/C standard of 0.99 is used for ODOT-controlled intersections along Lombard Street (US-30) and MLK Jr. Boulevard (OR-99W), that are not ramp terminals, for the Existing, No-Build and LPA scenarios as stated in the OHP (Table 7, 2004 update).

Note 4 The PBOT operational standard for signalized intersections is LOS D and, for unsignalized intersections, is LOS E.

Exhibit 5-57

OREGON
N Marine Dr
Columbia River
North Portland Harbor
Marine Drive
23
22
21
N Marine Dr
5
Portland
Delta Park
MLK Jr Blvd
Vancouver Way
Union Ct
99E
Principal Arterial
Minor Arterial
Urban Collector
Minor Collector

Exhibit 5-58



Principal Arterial
Minor Arterial
Urban Collector
Minor Collector
Victory Blvd
18
19
20
Denver
Whitaker Rd
Columbia Slough
Schmeer Rd
N Columbia Blvd
15
Kilpatrick St
5

Exhibit 5-59

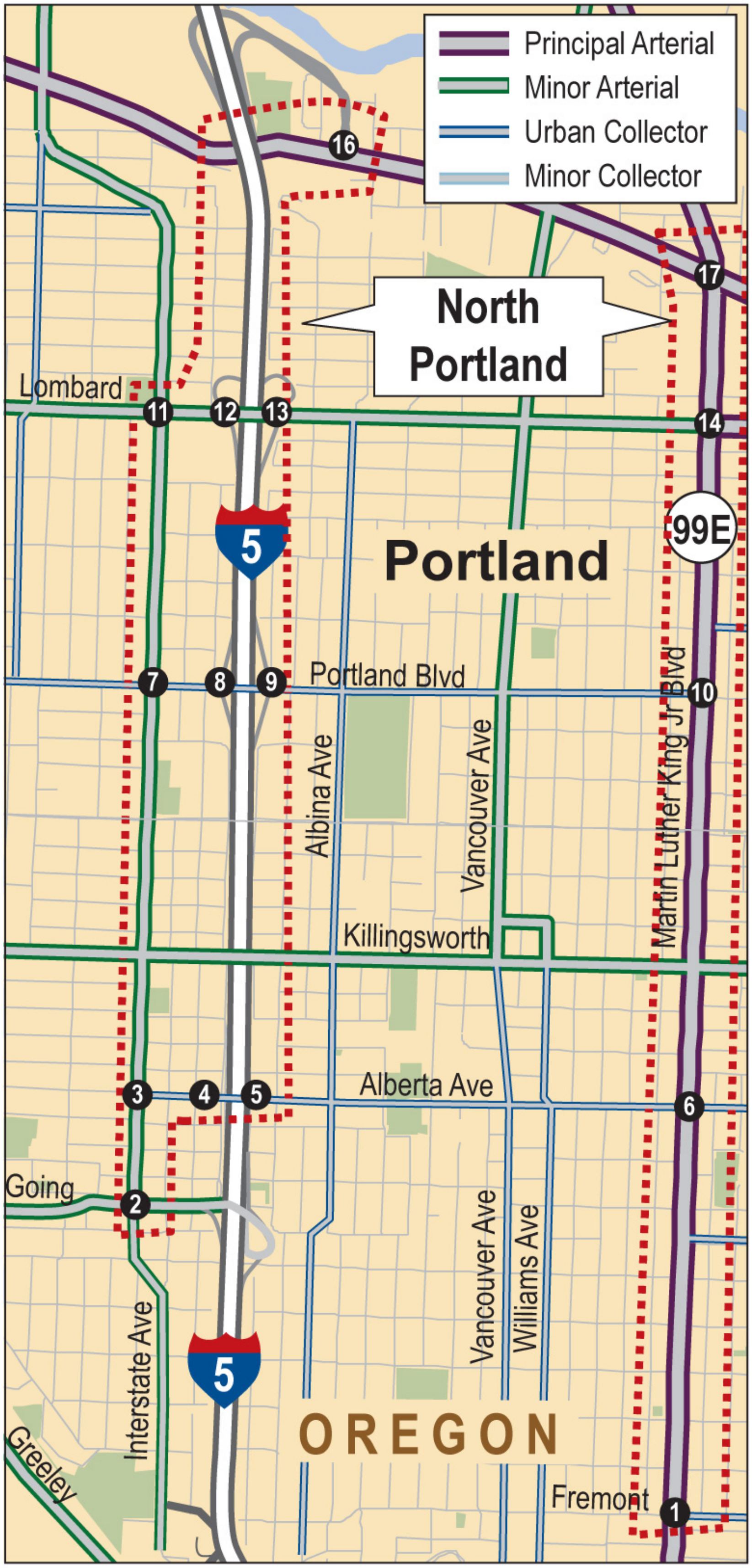

Principal Arterial
Minor Arterial
Urban Collector
Minor Collector
North Portland
Portland
OREGON
Lombard
Portland Blvd
Killingsworth
Alberta Ave
Going
Fremont
Greeley
Interstate Ave
Albina Ave
Vancouver Ave
Williams Ave
Martin Luther King Jr Blvd
5
99E
1
2
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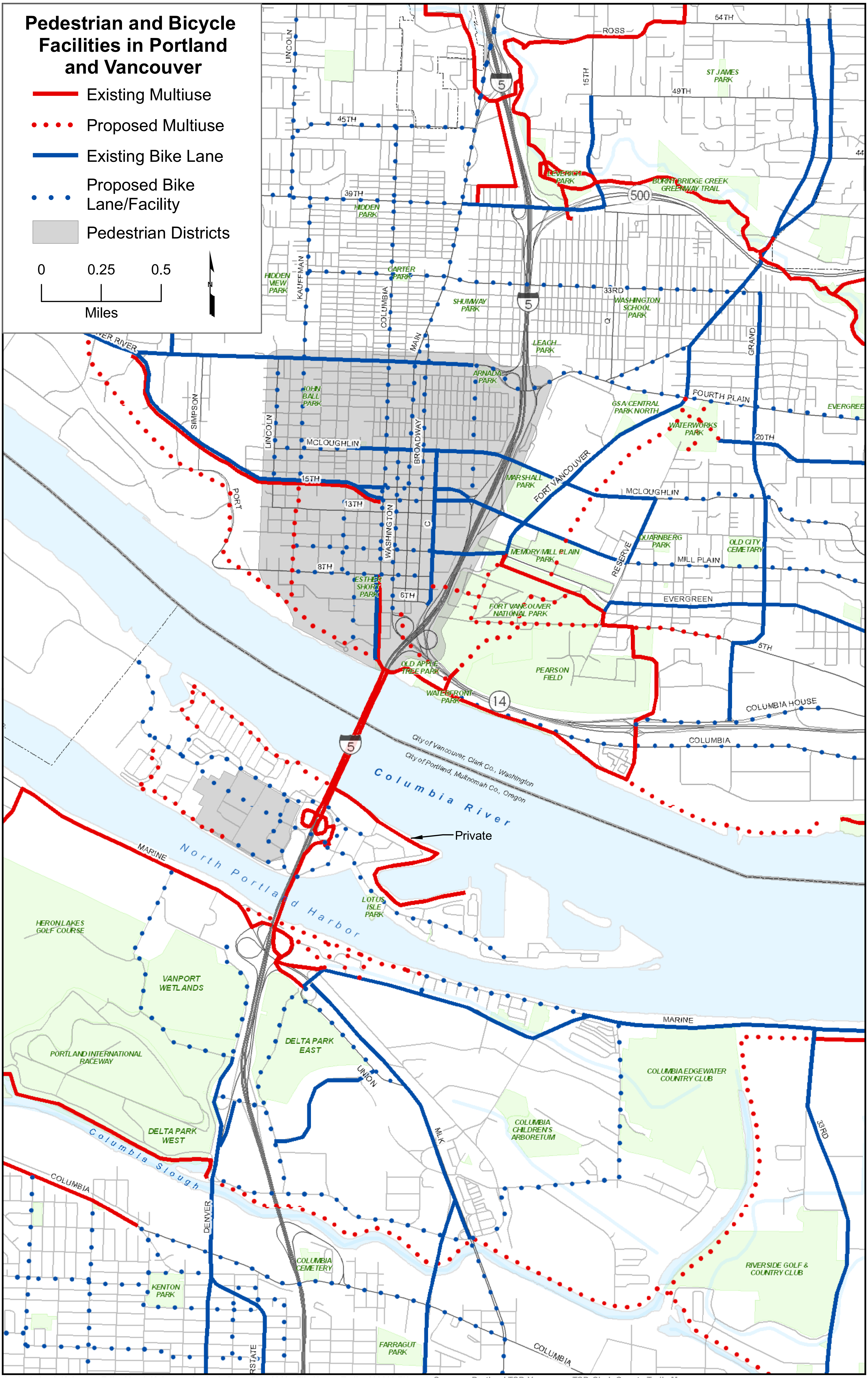
Exhibit 5-60



Sources: Portland TSP, Vancouver TSP, Clark County Trails Map

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Exhibit 5-61

Count Locations: All three river crossings
Count Date: Tuesday, September 11, 2007
Count Time: 6 AM to 8 PM
Weather: Sunny and clear

I-5 and I-205 Columbia River Crossing Bicycle and Pedestrian Volumes (September 11, 2007)									
	NB			SB			Hourly Totals		
Hour	**Bike**	**Ped**	**Total**	**Bike**	**Ped**	**Total**	**Bikes**	**Peds**	**Volume**
6:00 AM	14	3	17	16	1	17	30	4	34
7:00 AM	30	0	30	36	0	36	66	0	66
8:00 AM	21	2	23	13	2	15	34	4	38
9:00 AM	14	1	15	31	4	35	45	5	50
10:00 AM	5	3	8	12	3	15	17	6	23
11:00 AM	6	1	7	10	1	11	16	2	18
12:00 PM	10	2	12	8	0	8	18	2	20
1:00 PM	16	2	18	5	3	8	21	5	26
2:00 PM	4	6	10	5	7	12	9	13	22
3:00 PM	23	0	23	12	2	14	35	2	37
4:00 PM	22	5	27	16	3	19	38	8	46
5:00 PM	46	7	53	20	2	22	66	9	75
6:00 PM	42	9	51	27	0	27	69	9	78
7:00 PM	12	4	16	16	1	17	28	5	33
14-Hour Totals	**265**	**45**	**310**	**227**	**29**	**256**	**492**	**74**	**566**

Exhibit 5-62

Count Location: South end of Glenn Jackson Bridge shared-use path @ Airport Way
Count Date: Tuesday, September 11, 2007
Count Time: 6 AM to 8 PM
Weather: Sunny and clear

I-205 Glenn Jackson Bridge Bicycle and Pedestrian Volumes (September 11, 2007)									
	NB			SB			Hourly Totals		
Hour	**Bike**	**Ped**	**Total**	**Bike**	**Ped**	**Total**	**Bikes**	**Peds**	**Volume**
6:00 AM	1	0	1	11	0	11	12	0	12
7:00 AM	14	0	14	11	0	11	25	0	25
8:00 AM	13	0	13	5	0	5	18	0	18
9:00 AM	10	0	10	9	0	9	19	0	19
10:00 AM	1	0	1	5	0	5	6	0	6
11:00 AM	1	0	1	6	0	6	7	0	7
12:00 PM	4	2	6	2	0	2	6	2	8
1:00 PM	6	0	6	1	1	2	7	1	8
2:00 PM	1	2	3	2	2	4	3	4	7
3:00 PM	9	0	9	8	0	8	17	0	17
4:00 PM	5	1	6	8	1	9	13	2	15
5:00 PM	6	1	7	14	0	14	20	1	21
6:00 PM	13	0	13	10	0	10	23	0	23
7:00 PM	6	0	6	6	0	6	12	0	12
14-Hour Totals	**90**	**6**	**96**	**98**	**4**	**102**	**188**	**10**	**198**

Exhibit 5-63

Count Location: West pathway entrance at I-5 Interstate Bridge bridgehead on Hayden Island
Count Date: Tuesday, September 11, 2007
Count Time: 6 AM to 8 PM
Weather: Sunny and clear

I-5 Interstate Bridge West Pathway Bicycle and Pedestrian Volumes (September 11, 2007)

	NB			SB			Hourly Totals		
Hour	**Bike**	**Ped**	**Total**	**Bike**	**Ped**	**Total**	**Bikes**	**Peds**	**Volume**
6:00 AM	11	3	14	2	1	3	13	4	17
7:00 AM	15	0	15	5	0	5	20	0	20
8:00 AM	6	1	7	4	0	4	10	1	11
9:00 AM	4	1	5	17	4	21	21	5	26
10:00 AM	4	1	5	4	3	7	8	4	12
11:00 AM	5	1	6	4	1	5	9	2	11
12:00 PM	6	0	6	5	0	5	11	0	11
1:00 PM	9	2	11	1	2	3	10	4	14
2:00 PM	3	4	7	2	2	4	5	6	11
3:00 PM	5	0	5	3	2	5	8	2	10
4:00 PM	9	4	13	7	0	7	16	4	20
5:00 PM	25	1	26	6	2	8	31	3	34
6:00 PM	19	2	21	11	0	11	30	2	32
7:00 PM	2	1	3	4	1	5	6	2	8
14-Hour Totals	**123**	**21**	**144**	**75**	**18**	**93**	**198**	**39**	**237**

Exhibit 5-64

Count Location: East pathway entrance at I-5 Interstate Bridge bridgehead on Hayden Island
Count Date: Tuesday, September 11, 2007
Count Time: 6 AM to 8 PM
Weather: Sunny and clear

I-5 Interstate Bridge East Pathway Bicycle and Pedestrian Volumes (September 11, 2007)									
	NB			SB			Hourly Totals		
Hour	**Bike**	**Ped**	**Total**	**Bike**	**Ped**	**Total**	**Bikes**	**Peds**	**Volume**
6:00 AM	2	0	2	3	0	3	5	0	5
7:00 AM	1	0	1	20	0	20	21	0	21
8:00 AM	2	1	3	4	2	6	6	3	9
9:00 AM	0	0	0	5	0	5	5	0	5
10:00 AM	0	2	2	3	0	3	3	2	5
11:00 AM	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	1	0	1	1	0	1
1:00 PM	1	0	1	3	0	3	4	0	4
2:00 PM	0	0	0	1	3	4	1	3	4
3:00 PM	9	0	9	1	0	1	10	0	10
4:00 PM	8	0	8	1	2	3	9	2	11
5:00 PM	15	5	20	0	0	0	15	5	20
6:00 PM	10	7	17	6	0	6	16	7	23
7:00 PM	4	3	7	6	0	6	10	3	13
14-Hour Totals	**52**	**18**	**70**	**54**	**7**	**61**	**106**	**25**	**131**

Exhibit 5-65

Bicycle and Pedestrian Existing Conditions

Annotations

1. The approach to the bridge is narrow, has limited signage and no crosswalk.
2. The bridge pathway access point is only 41" wide, and is separated from traffic by a 26" barrier.
3. The east pathway access point pavement is broken and uneven. The path is separated from traffic by a 26" barrier. A telephone pole is placed in the middle of the bike path.
4. Access to/from the bridge is via a steep path with inadequate height railings. SE Columbia Way has no crosswalks or bike lanes. Signage is minimal.
5. The bridge path narrows to 42" at the lift gate. Fixed objects such as protruding cables and chain link gates pose a hazard.
6. The bridge pathway is 4 feet wide. The railing is low – 41". Lighting is poor. Debris and bird dropping litter the path. Noise and emissions from passing traffic make the trip uncomfortable. Heavy trucks make the bridge vibrate. There is not enough separation from the traffic stream. There is a general perception that conditions are unsafe and substandard. There is no safe place to stop and enjoy the view.
7. Railing is 44" high, but there is an open space between the bottom of the railing and the path.
8. Bridge access point is narrow, with a 24" barrier separating the path from traffic. The turn-off onto Hayden Island is sharp. Landscaping has overgrown and narrowed the path.
9. Directional signage is missing, confusing or contradictory. The tunnel underneath the freeway can be intimidating at night and needs lighting improvements.
10. The barrier separating the path from traffic stream is only 26". Pathway is too narrow for two bikes to pass.
11. Path is overgrown. Signage points bikers and pedestrians to the less safe bridge east pathway.
12. Pedestrian push button is inaccessible for wheelchair users. Little to no room on curb for multiple bicyclists and walkers. Signal cycle is overly long.
13. Lack of safety at Tomahawk Drive crosswalk. Exiting vehicles have poor visibility and short sight distances. There is no crosswalk signal.
14. Path from Harbor Bridge to Interstate Bridge is circuitous and confusing and lacks a direct connection. There are a high number of vehicle and pedestrian/bicyclist conflicts. High heavy vehicle percentage creates a less comfortable environment.
15. The Portland Harbor Bridge traffic barrier ranges from a standard height of 54" to a low of 39". Headlight glare from oncoming vehicles making biking southbound at night difficult. Expansion joints and poorly patched utility work make for uneven obstacle-laden path.
16. Paths and grassy areas littered with trash – no garbage cans in the area. Circuitous paths and poor accessibility.
17. Narrow, cracked sidewalks at Marine Drive intersection. Long signal cycles. Number of heavy trucks and high traffic speeds make area intimidating.
18. Sidewalk to Expo Center MAX station is narrow and roadway has no shoulder. Path to MAX station is too narrow and has too many sharp curves. The MAX station lacks curb cutouts. Lack of signage pointing toward station.
19. Path alongside northbound on-ramp has poor sight-distances and needs re-striping. Directional signage is damaged and confusing.
20. Access to Delta Park has no crosswalk. Stop bar is located too close to intersection.
21. Delta Park pavement is bumpy, poorly patched, and makes riding uncomfortable.
22. Intersection near Union 76 lacks crosswalks, bike lanes and is difficult for bicyclists to access Delta Park without taking a long circuitous path.

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6. No-Build Alternative

6.1 Description of Transportation System

The No-Build Alternative was developed to quantify the transportation impacts in the Bridge Influence Area for the year 2030 of not building a project. As such, it serves as the basis of comparison for transportation performance of the build alternatives.

The CRC project uses 2030 as the horizon year for all alternatives. The No-Build Alternative includes planned improvements up to the year 2030 for which need, commitment, financing, and public and political support are identified and are reasonably expected to be implemented. All transportation improvements included in the No-Build Alternative are included in either Metro's 2025 RTC (including amendments) or the RTC's 2030 Metropolitan Transportation Plan (MTP).

The No-Build Alternative assumes one major capacity projects on Interstate 5 within the Bridge Influence Area: the southbound I-5 widening to three lanes from Lombard Street to Victory Boulevard, a project that was in the planning stages when the CRC project began, but which was completed in 2010. Outside the Bridge Influence Area, a major capacity improvement is planned for the Rose Quarter area that involves braiding the I-84 and Broadway/Weidler on- and off-ramps in both the northbound and southbound directions. In addition, there are some minor I-5 capacity enhancements and several major maintenance projects, specifically identified in the financially constrained regional transportation plans of both Metro and RTC. In Vancouver, additional ramp meters would be added to I-5 within the Bridge Influence Area at several locations.

Metro's adopted 2025 Regional Transportation Plan (RTP) was used to develop the No-Build Alternative. Metro has compiled a list of projects for the years 2026-2030, which have been approved by Metro's Transportation Policy Alternatives Committee (TPAC).

RTC's MTP has been updated to reflect a 2030 horizon year. The plan was adopted by the RTC in December 2007. In July 2008, RTC amended the MTP to include the Columbia River Crossing project's Locally Preferred Alternative.

Annual system-wide increases in TriMet's transit service hours are forecast to be between 1.0 percent and 1.5 percent per year, consistent with the RTP 2025 financially constrained transit network.

C-TRAN fixed route service hours will remain constant through 2010, based on the current funding that preserves existing levels of service for the foreseeable future (Preservation Plan through 2011). However, C-TRAN will experience a 2.0 percent average annual decrease in fixed route service hours from 2011 to 2030, although commuter service across the Columbia River is expected to remain relatively constant.

6.2 I-5 and I-205 Performance

This section summarizes highway performance for the No-Build Alternative. It explains how existing transportation conditions would change by the year 2030 without the improvements proposed by this project.

6.2.1 Daily Traffic Levels

By 2030, the average weekday traffic across the I-5 bridge is forecast to reach 184,000 vehicles per day, an increase of 37 percent over current conditions. Daily traffic levels on the I-205 bridge are projected to rise to 210,000 vehicles per day, an increase of 44 percent over current volumes. For the I-5 and I-205 bridges together, daily auto traffic volumes would increase by 41 percent over existing levels, while truck traffic would increase 77 percent over existing conditions. **Exhibit 6-1** summarizes ADT volumes on the I-5 bridge, the I-205 bridge, and the total river crossing.

6.2.2 Traffic Demand – Vehicles

This section compares traffic conditions in 2030 with the No-Build Alternative to existing conditions for the four-hour morning and four-hour afternoon/evening peaks.

Freeway traffic volumes were developed using the following seven-step process:

1. Summarize 2005 existing count data.
2. Summarize year 2005 and 2030 four-hour VISUM volumes.
3. Convert four-hour VISUM volumes into four, one-hour volumes, based on the percentage that each of the four one-hour periods consists of the total four-hour VISUM volume.
4. Calculate the 25-year forecast peak hour volume difference between 2005 and 2030 VISUM model.
5. Calculate the percentage of the 2030 total “screenline” segment on- and off-ramp volumes for each individual on- and off-ramp in the “screenline” segment.
6. Multiply the individual ramp percentages calculated in step 5 by the total on- or off-ramp volume difference calculated from step 4, and add this to the existing 2005 ramp volume.
7. Adjust the calculated ramp volumes in step 6 for the effects of adding or removing new on- and off-ramps, tolling, and increased development on Hayden Island.

The local roadway traffic volumes were developed using the following steps:

1. Summarize 2005 existing count data.
2. Summarize year 2005 and 2030 VISUM volumes.

3. Calculate the 25-year growth rate between 2005 and 2030 VISUM model.
4. Grow existing volumes using the growth rates from the regional model.
5. Adjust the calculated volumes in step 4 for consistency with adopted plans and policies including the adopted Vancouver Central City Vision (VCCV) plan.

6.2.2.1 Vehicle Demands on I-5

Exhibit 6-2 compares forecast four-hour morning peak traffic demand for southbound I-5 to existing traffic volumes. Southbound traffic demand on the I-5 bridge would increase by 5,200 vehicles during the four-hour morning peak, a 26 percent increase over existing demand. Traffic demand would continue to be well in excess of I-5's available capacity, resulting in substantially increased congestion. Corridor-wide, the highest growth is projected to occur in northern Clark County (100 percent) and the lowest growth projected for North Portland (less than five percent). The growth projected within the Bridge Influence Area ranges from 20 to 35 percent.

Slightly higher growth is forecast for northbound I-5 during the four-hour morning peak as shown in **Exhibit 6-3**. Under the No-Build Alternative, northbound traffic demand at the Interstate Bridge is expected to increase by 5,700 vehicles, or 51 percent. Corridor-wide, the highest growth in traffic demand is projected to occur in northern Clark County (60 to 145 percent over existing conditions) and the lowest growth in North Portland (20 to 35 percent over existing conditions). The Bridge Influence Area growth forecasts range from 45 percent to 65 percent over existing conditions.

During the four-hour afternoon/evening peak, southbound I-5 traffic demand is forecast to increase by 4,000 vehicles at the Interstate Bridge, a 27 percent increase over existing conditions. Growth rates for southbound I-5 traffic demand during the four-hour afternoon/evening peak is forecast to range from 10 to 20 percent over existing conditions in North Portland, 20 to 40 percent within the Bridge Influence Area, and from 40 to over 100 percent in northern Clark County as shown in **Exhibit 6-4**.

Northbound traffic demand is forecast to increase by 6,900 vehicles at the Interstate Bridge, or 32 percent, during the four-hour afternoon/evening peak. The resulting traffic demand will continue to be well above I-5's available capacity, resulting in increased congestion. The highest growth in the I-5 corridor is forecast in northern Clark County (from 30 to 100 percent over existing conditions) and the lowest increases are projected in North Portland (from 10 to 30 percent over existing conditions) as shown in **Exhibit 6-5**. The Bridge Influence Area growth forecasts range from 30 to 35 percent over existing conditions.

6.2.2.2 Vehicle Demands on I-205

Exhibit 6-6 compares existing and No-Build traffic demand for southbound I-205. Weekday southbound I-5 two-hour morning peak traffic demand is projected to increase through the corridor by between 10 and 90 percent over existing conditions, with the highest growth in Vancouver.

Slightly higher growth is forecast for northbound I-205 during the two-hour morning peak, as shown in **Exhibit 6-7**. Growth is expected to range from 15 to 140 percent over existing conditions, with the highest growth forecast for Vancouver.

Growth rates for southbound I-205 two-hour afternoon/evening peak traffic demand are forecast to range from 15 to 95 percent along the I-205 corridor. These trends are shown in **Exhibit 6-8**. Forecast growth rates for northbound I-205 two-hour afternoon/evening peak traffic demands shown in **Exhibit 6-9** are estimated to range from remaining flat to 95 percent over existing conditions.

6.2.3 Traffic Demand – Truck Freight

Truck volume forecasts for 2030 are based on the *Portland/Vancouver International and Domestic Trade Capacity Analysis* growth forecasts for cargo. **Exhibit 6-10** presents the regional cargo forecasts by mode, and the resulting growth for each mode. All cargo is estimated to increase by 2.0 percent per year, and truck transport as a mode share of all cargo transport is expected to increase from 67 percent in 2000 to 73 percent in 2030. The compound annual growth rate (CAGR) for truck traffic, calculated for the period 2000 to 2030, is estimated at 2.3 percent per year.

Previous analysis showed that rail does not have the capacity to accommodate a meaningful shift of freight from truck to rail, nor would the type of freight generally carried by truck be expected to shift to rail (*Feasibility of Diverting Truck Freight to Rail in the Columbia River Corridor,* Draft Technical Memorandum, CRC, April 2005). The conclusions in the technical memorandum support the assumption that freight traffic in the I-5 corridor cannot easily shift modes, and that growth in truck volumes would continue to increase.

With more severe peak period congestion expected, more truck drivers may avoid the peak periods and travel during midday or nighttime hours to increase travel time reliability. At the same time, trucks would be required to move more freight volume each day to meet customer schedules and operating hours. The daily truck volume forecast to cross the I-5 bridge would increase from 11,000 under existing conditions to 19,400 under No-Build conditions (9,800 southbound and 9,600 northbound), an increase of over 8,400 trucks or 77 percent. The forecasted increase in truck volume means that not all trucks would be able to shift their travel outside of the peak congestion periods, which would result in increased travel times, wasted fuel and costs to customers.

Exhibit 6-11 illustrates total truck throughput during the morning and afternoon/evening peaks, the midday period (10 a.m. to 3 p.m.), and nighttime hours (7 p.m. to 6 a.m.) across the Interstate Bridge. It is expected that truck volumes would continue to increase during congested periods, but at a slower rate than overall growth in truck volumes; more trucks would move to midday or nighttime hours to avoid congested conditions. With approximately 7.75 hours of congestion northbound and 7.25 hours of congestion southbound, the No-Build Alternative would have a significant impact on truck travel time and reliability. Approximately 7,400 trucks are projected to travel daily across the Interstate Bridge during congested conditions with the No-Build Alternative.

6.2.3.1 Truck Operating Characteristics

As discussed, the rate of growth for truck traffic is expected to be significantly greater than for general-purpose traffic; this would have the effect of increasing the proportion of trucks in the traffic stream. Trucks consume approximately 2.5 times the highway capacity compared to passenger cars; therefore, in the future, the proportion of capacity used by trucks will be greater than today. The degradation in highway operations caused by slow-moving trucks at interchanges and on the I-5 mainline due to geometric conditions (uphill ramp grades, super-elevation, and merge distances) would be exacerbated in the future due to the increase in truck traffic relative to auto traffic.

6.2.3.2 Oversized Loads

The number of oversized truck loads is expected to increase in the future; the actual number of oversized trucks loads depends on the quantity and type of products that would be shipped in the future. For example, there are a number of wind turbine parts shipments that travel through the Bridge Influence Area today and require oversized truck loads. In the future, the number of oversized loads would be expected to increase as the volume of wind turbine parts shipments increase, or other specialized products begin to be transported through the project corridor. Oversize loads would generally experience the same level of congestion and reduction in travel speed as all trucks. Oversize loads attempt to avoid peak period conditions more than general truck traffic (and transportation permit conditions may require that they avoid peak commute periods). With the No-Build Alternative, there would be an additional nine hours of congestion near the Interstate Bridge to avoid.

6.2.4 Effect of Congestion

This section compares conditions in 2030 under the No-Build Alternative with existing conditions.

6.2.4.1 Duration of Congestion on Southbound I-5

Southbound congestion on the Interstate Bridge is expected to increase from two hours to 7.25 hours (see **Exhibit 6-12**). One of these hours would develop during the afternoon/evening peak in the reverse commute direction.

The Delta Park project (which was completed in 2010 and which widened I-5 southbound from two to three lanes between Victory Boulevard and Columbia Boulevard) eliminated the Delta Park lane drop bottleneck that existed in 2005 and was reflected in the Existing Conditions analysis. However, congestion and vehicular queuing would still exist through this portion of highway from the existing capacity constraint north of the I-405 split.

Southbound congestion north of the I-405 split would increase from 2.5 to 11 hours, with 3.75 hours of this forecast to occur during the afternoon/evening peak. The southbound bottleneck located near I-5’s lane drop in the Rose Quarter is forecast to increase from under three hours to 4.75 hours despite the planned I-84/Broadway/Weidler ramp improvements.

6.2.4.2 Duration of Congestion on Northbound I-5

Northbound congestion on the Interstate Bridge is expected to increase from four hours to almost eight hours (see **Exhibit 6-13**) from an increase in traffic volume trying to utilize the existing limited capacity across the Interstate Bridge.

Northbound congestion near the I-405/Rose Quarter weaving area would increase from just over two hours today to more than seven hours. Almost half of the congestion would occur during the morning peak. Northbound congestion in the weaving area located on the Marquam Bridge upstream from the off-ramp to I-84 would increase from five hours to approximately seven hours.

6.2.5 Travel Times

This section compares forecast travel times for the No-Build Alternative in 2030 with existing conditions using the two-hour morning and two-hour afternoon/evening peaks.

6.2.5.1 Travel Time along I-5

During the two-hour morning peak, southbound I-5 travel times are forecast to increase by three minutes (19 percent) for a vehicle trip along I-5 from SR 500 to Columbia Boulevard, and by 15 minutes (48 percent) for a vehicle trip from 179th Street to I-84 as shown in **Exhibit 6-14**. The 48 percent increase in travel time for the longer segment is due to the increase in congestion levels along I-5. Travel times for trips entering I-5 from SR 500, SR 14 and Mill Plain and crossing the Interstate Bridge would be longer under the No-Build Alternative than under existing conditions.

During the two-hour afternoon/evening peak, northbound I-5 travel times are forecast to increase by two minutes (17 percent) for a trip from Columbia Boulevard to SR 500 and by six minutes (16 percent) for a vehicle trip from I-84 to 179th Street, as shown in **Exhibit 6-15**. Northbound travel times are forecast to increase due to increased congestion in the two existing bottleneck locations (Interstate Bridge and I-405/Rose Quarter weave) and along the entire I-5 corridor between the two bottleneck locations.

6.2.5.2 Travel Time along I-205

During the two-hour morning peak, southbound I-205 travel times are forecast to increase by 21 minutes (almost 200 percent) for a vehicle trip along I-205 from SR 500 to I-84, as shown in **Exhibit 6-16**. The substantial increase in travel times would be due to the increased congestion forecast for southbound I-205 during the morning peak.

During the two-hour afternoon/evening peak, northbound I-205 travel times are forecast to increase by five minutes (36 percent) for a vehicle-trip from I-84 to SR 500, as shown in **Exhibit 6-17**. The increase in travel times would be caused by increase in volume and resulting congestion for northbound I-205 during the afternoon/evening peak.

6.2.6 Service Volumes

This section compares forecast service volumes for the No-Build Alternative in 2030 with existing conditions using the four-hour morning and four-hour afternoon/evening peaks.

6.2.6.1 Vehicle Throughput (Served Volume) on Southbound I-5

During the four-hour morning peak, southbound vehicle throughput along I-5 near the Pioneer Street interchange is expected to double from 9,000 vehicles to over 18,000 vehicles (see **Exhibit 6-18**). The 100 percent increase in vehicle throughput would result primarily due to forecast land use changes identified for northern Clark County and is consistent with the growth seen in the regional travel demand model.

Vehicle throughput near the SR 500 interchange is forecast to increase by 3,500 vehicles (20 percent) for 2030 No-Build conditions compared to existing conditions. Although the 2030 No-Build Alternative would serve more volume, it would not serve the actual forecast demand due to downstream bottlenecks located at the Interstate Bridge and north of the I-405 split.

Similarly, the southbound vehicle throughput across the Interstate Bridge is forecast to increase by 3,000 vehicles (16 percent). However, the entire forecast demand would not be served due to the southbound bottlenecks on I-5 at the Interstate Bridge and north of the I-405 split.

Four-hour peak period vehicle throughput along I-5 near I-405 is forecast to be similar under both 2030 No-Build conditions and existing conditions, and serve about 20,000 vehicles. Similar to I-5 near SR 500 and the Interstate Bridge, I-5 north of the I-405 split would not serve all of its forecast demand due to the two identified southbound bottlenecks.

6.2.6.2 Vehicle Throughput (Served Volume) on Northbound I-5

During the four-hour afternoon/evening peak, northbound vehicle throughput along I-5 near I-405 is forecast to be slightly less compared to existing conditions (see **Exhibit 6-19**). The vehicle throughput is forecast to decrease by 2,000 vehicles (a decrease of 15 percent) due to increased downstream congestion at the Interstate Bridge, which would be present over the entire four-hour afternoon/evening peak, compared with only two hours of congestion under existing conditions.

Vehicle throughput across the Interstate Bridge is forecast to be similar under both No-Build and existing conditions. Under both scenarios, around 21,000 vehicles would be served during the four-hour peak. The Interstate Bridge would not serve all of its forecast demand (served volume would be 72 percent of total demand) due to the Interstate Bridge bottleneck.

Vehicle throughput near the SR 500 interchange is forecast to increase by 1,700 vehicles (70 percent) during the four-hour peak. Although the No-Build Alternative would serve more volume than existing conditions, it would not serve the entire forecast demand due to upstream bottlenecks located at the Interstate Bridge, I-405 and the Rose Quarter.

Northbound vehicle throughput near the Pioneer Street interchange is forecast to nearly double from 9,900 to over 18,000 vehicles over the four-hour afternoon/evening peak. The 85 percent increase in vehicle throughput would result primarily from forecast land use changes for northern Clark County and is consistent with the growth seen in the regional travel demand model.

6.2.7 Served vs. Unserved Ramp Volumes

This section compares ramp service levels for the No-Build Alternative in 2030 with existing conditions, using the four-hour morning and four-hour afternoon/evening peaks.

6.2.7.1 Southbound I-5

During the four-hour morning peak, the number of southbound on-ramps within the I-5 Bridge Influence Area unable to serve their traffic demands would increase from one (SR 14/City Center) under existing conditions to three (SR 500/39th Street, Mill Plain Boulevard, and SR 14/City Center) under No-Build conditions, as shown in **Exhibit 6-20**. During the four-hour morning peak, 2,600 vehicles at SR 500, 450 vehicles at Mill Plain Boulevard and 900 vehicles at SR 14/City Center would not be served, resulting in ramp back-ups and local street congestion. This increase would result primarily because of increased congestion forecast for southbound I-5 during the four-hour morning peak.

6.2.7.2 Northbound I-5

During the four-hour afternoon/evening peak, the number of northbound on-ramps unable to serve their traffic demands would increase from none under existing conditions to five (Interstate Avenue/Victory Boulevard, Marine Drive, Hayden Island, Mill Plain Boulevard and Fourth Plain Boulevard) under No-Build conditions, as shown in **Exhibit 6-21**. During the afternoon/evening peak, 1,700 vehicles at Interstate Avenue/Victory Boulevard, 650 vehicles at Marine Drive, 1,150 vehicles at Hayden Island, 1,350 vehicles at Mill Plain Boulevard, and 100 vehicles at Fourth Plain Boulevard would not be served, resulting in ramp back-ups and local street congestion. This increase would result primarily because of the increased congestion forecast for northbound I-5 during the four-hour afternoon/evening peak.

6.2.8 Person Throughput

Under No-Build conditions, about 24,800 persons in southbound vehicles would cross the I-5 bridge during the four-hour morning peak, an increase of 15 percent over existing conditions. About 3,050 persons in buses are also forecast to cross during this period.

About 26,500 persons in northbound vehicles would cross the I-5 bridge during the four-hour afternoon/evening peak. This is similar to how many cross during existing conditions. About 2,200 persons in buses are also forecast to cross during this period. **Exhibit 6-22** shows person-throughput data.

6.2.9 Interstate Bridge Gate Closures

A typical gate closure on the Interstate Bridge was simulated using the VISSIM microsimulation model for the 2030 No-Build Alternative. The typical gate closure simulated in VISSIM was based on bridge gate closure data collected for the years 2005-2007 as discussed under **Section 5.2.10** of this report.

The existing conditions data reveals that the most typical time for a gate closure on the Interstate Bridge during both the four-hour morning and four-hour afternoon/evening peak periods is during the first full hour (9 a.m. to 10 a.m.) after the end of the morning gate closure restriction. During this hour, the average start time for a gate closure is 9:25 a.m., and the average length of time traffic was stopped was 11 minutes. These typical conditions therefore became the basis for the No-Build Alternative gate closure analysis. The simulation covered the morning peak and included both the northbound and southbound directions of traffic.

The simulation results presented in **Exhibit 6-23** showed that an average bridge gate closure occurring after 9 a.m. would cause an additional 1.25 hours of congestion at the bridge in year 2030, raising the amount of daily southbound congestion from 7.25 to 8.5 hours, an increase of 17 percent. For the northbound direction results, shown in **Exhibit 6-24**, a typical gate closure would increase daily congestion by one hour, from 7.75 to 8.75 hours, a rise of 13 percent.

A typical gate closure during the hour between 9 a.m. and 10 a.m. would increase the extent of the southbound traffic queue from the 39th Street/SR 500 interchange to the 79th Street interchange, a distance of over 1.5 miles. In the northbound direction, a typical gate closure during the hour between 9 a.m. and 10 a.m. would create a traffic queue where none would otherwise exist. The extent of the traffic queue would reach the Victory Boulevard interchange.

6.2.10 Safety

6.2.10.1 Prediction of Future Collision Potential

The existence of non-standard geometric design features, the presence and duration of current congested traffic conditions, and the occurrence of I-5 bridge gate closures all contribute to the high number of vehicular collisions and the high collision rate currently experienced in the Bridge Influence Area.

Collision rates are highest during the hours where highway volumes simultaneously approach the observed maximums on I-5 *and* when a breakdown in traffic flow occurs. For example, in **Exhibit 6-25**, traffic volumes on I-5 northbound between 1 and 2 p.m. and between 3 and 4 p.m. are similar and close to the observed I-5 maximum capacity, however, as seen in **Exhibit 6-13,** congestion during the 1 to 2 p.m. hour is not as intense as between 3 and 4 p.m. The difference in traffic flow conditions between these two periods, despite the fact that similar traffic volumes are served, results in a lower crash rate (1.69 MVMT) for the 1 to 2 p.m. period, and a higher crash rate (2.82 MVMT) for the 3 to 4 p.m. period.

To estimate the potential number of collisions in the No-Build scenario, hourly collisions rates from existing conditions of peak volumes and congestion were applied to similar periods of peak volumes and congestion in the No-Build scenario. Collision rates for other hours in the No-Build were assigned based upon collision rates for hours with similar traffic volumes under existing conditions. Collision rates were then used to calculate the number of crashes over a five-year period using forecasted ADTs in the five-mile corridor.

Based upon the analysis, the number of collisions is likely to increase, potentially up to approximately 80 percent over existing conditions, as the existing non-standard features would remain on I-5 and its ramps, traffic levels would increase, the duration of congestion lengthens, and I-5 bridge gate closures would continue at their current rate or increase in the future.

Exhibit 6-25 shows predicted future collisions along northbound I-5 assuming no improvements are made within the Bridge Influence Area (existing non-standard geometric features remain and no traffic capacity is added) and traffic demands increase to forecast 2030 levels.

Exhibit 6-25 illustrates collisions would mostly increase during the additional hours of congestion experienced on I-5 northbound in 2030. The primary hours of additional congestion would be from 10 a.m. to 2 p.m. and from 6 p.m. to 9 p.m. During those two time periods traffic volumes will be at or near highway capacity and it would be expected that the collision rates observed during those two time periods would be roughly equivalent to the collision rate measured during the peak hours of travel in 2005. Collisions would also be expected to increase during the peak morning hours between 6 a.m. and 9 a.m. as northbound traffic volumes would increase by approximately 30 percent. Similar results are expected southbound on I-5 within the Bridge Influence Area.

6.3 Local Streets

6.3.1 Travel Demand

This section compares existing and future local street travel demand under the No-Build Alternative, using the morning and afternoon/evening peak one-hour period.

6.3.1.1 Vancouver Screenlines – Morning Peak Hour

During the morning peak hour, westbound traffic west of I-5 is forecast to increase between 40 and 115 percent, with the largest growth forecast for western Vancouver as shown in **Exhibit 6-26**. Eastbound traffic west of I-5 is forecast to increase between 20 and 45 percent, with the largest increase for western Vancouver due to large population and growth increases forecast for this part of the city from the regional model. Eastbound and westbound traffic just east of I-5 is forecast to increase by about 30 to 35 percent over existing conditions.

During the morning peak, southbound traffic in Vancouver is forecast to increase between 45 and 65 percent. Northbound traffic in Vancouver is forecast to increase by up to 30 percent, with the highest growth forecast for downtown Vancouver.

6.3.1.2 Vancouver Screenlines – Afternoon/Evening Peak Hour

During the afternoon/evening peak, westbound traffic west of I-5 is forecast to increase between 35 and 60 percent, with the largest growth also forecast for western Vancouver as shown in **Exhibit 6-27**. Eastbound traffic west of I-5 is forecast to increase between 40 and 100 percent, again with the largest increase for western Vancouver due to large population and growth increases forecast for this part of the city. East of I-5, eastbound traffic is forecast to increase more (45 percent) compared to westbound traffic (20 percent) over existing conditions.

During the afternoon/evening peak, southbound traffic in Vancouver is forecast to increase between five and 20 percent, with the highest growth forecast near the Mill Plain couplet. Northbound traffic in Vancouver is forecast to increase between 35 and 55 percent, with the highest growth forecast for downtown Vancouver.

6.3.1.3 Portland Screenlines – Morning Peak Hour

During the morning peak hour, eastbound and westbound traffic west of I-5 is forecast to increase between 25 and 40 percent over existing conditions, as shown in **Exhibit 6-28**. East of I-5, eastbound and westbound traffic is forecast to increase between 20 and 30 percent over existing conditions.

During the morning peak, southbound traffic in Portland is forecast to increase between 15 and 20 percent. Northbound traffic in Portland is forecast to increase between 30 and 70 percent, with the highest growth forecast near Alberta Street.

6.3.1.4 Portland Screenlines – Afternoon/Evening Peak Hour

During the afternoon/evening peak, eastbound and westbound traffic west of I-5 is forecast to increase between 25 and 40 percent over existing conditions, as shown in **Exhibit 6-29**. East of I-5, eastbound and westbound traffic is forecast to increase between 20 and 25 percent over existing conditions.

During the morning peak, southbound traffic in Portland is forecast to increase between 25 and 40 percent, with the highest growth forecast near Rosa Parks Way and Alberta Street. Northbound traffic in Portland is forecast to increase between 15 and 20 percent.

6.3.2 Intersection Operational Performance

This section compares intersection LOS under existing conditions and future No-Build Alternative, using the morning and afternoon/evening peak one-hour period.

6.3.2.1 Vancouver Service Levels – Morning and Afternoon/Evening Peak Hours

6.3.2.2 SR 14/City Center Interchange Area Operational Performance

The No-Build roadway network includes projects from RTC's MTP. Projects in the SR 14/City Center area include converting Broadway and Main Streets from one-way to two-way streets. In addition, the expansion of Third/Fourth Street and Columbia Way will add new intersections. As shown in **Exhibit 6-30**, the SR 14/City Center interchange area has 36 study intersections, of which three would be new intersections that do not currently exist. New or revised intersections are labeled with single letters instead of numbers to help with the identification.

As shown in **Exhibit 6-31**, during the morning peak, all 36 of the study intersections would operate acceptably with improved, similar, or slightly degraded conditions as compared to the existing conditions. The three new intersections would operate acceptably. As shown in **Exhibit 6-32**, during the afternoon/evening peak, all 36 of the study intersections would operate acceptably with improved, similar, or slightly degraded conditions as compared to the existing conditions. The three new intersections would operate acceptably.

As shown in **Exhibit 6-31**, during the morning peak, 33 of the study intersections would operate with acceptable vehicle queuing when compared to the existing conditions. All three of the new intersections would operate with acceptable vehicle queuing. Based on 95% queuing analysis, three intersections would experience queuing extending past turn lane storage capacities or to upstream intersections, which does not occur under the existing conditions.

As shown in **Exhibit 6-32**, during the afternoon/evening peak, 31 of the study intersections would operate with acceptable vehicle queuing. All three of the new intersections would operate with acceptable vehicle queuing. Based on 95% queuing analysis, five intersections would experience queuing extending past turn lane storage capacities or to upstream intersections, which does not occur under the existing conditions.

6.3.2.3 Mill Plain Boulevard Interchange Area Operational Performance

The No-Build roadway network includes projects from RTC's MTP. In addition the No-Build roadway network assumes signal pre-emption along Mill Plain Boulevard and 15th Street benefitting truck progression east and west along those two corridors. As shown in **Exhibit 6-33**, the Mill Plain Boulevard interchange area consists of 26 study intersections, all of which currently exist. Revised intersections are labeled with single letters instead of numbers to help with the identification.

As shown in **Exhibit 6-31**, during the morning peak, all 26 study intersections would operate acceptably with improved, similar, or slightly degraded conditions compared to existing conditions. No intersections would degrade from acceptable or unacceptable operations under existing conditions to unacceptable operations under the No-Build Alternative.

As shown in **Exhibit 6-32**, during the afternoon/evening peak, 24 of the study intersections would operate acceptably with improved, similar, or slightly degraded conditions. Two intersections would degrade from acceptable or unacceptable operations under existing conditions to unacceptable operations.

As shown in **Exhibit 6-31**, during the morning peak, 16 of the study intersections would operate with acceptable vehicle queuing when compared to the existing conditions. Based on 95% queuing analysis, 10 intersections would experience queuing extending past turn lane storage capacities or to upstream intersections, which does not occur under the existing conditions.

As shown in **Exhibit 6-32**, during the afternoon/evening peak, 18 of the study intersections would operate with acceptable vehicle queuing. Based on 95% queuing analysis, eight intersections would experience queuing extending past turn lane storage capacities or to upstream intersections, which does not occur under the existing conditions.

6.3.2.4 Fourth Plain Boulevard Interchange Area Operational Performance

The No-Build roadway network includes projects from RTC's MTP. Fourth Plain Boulevard would be widened to a five-lane cross section from the southbound on-/off-ramps to the west. As shown in **Exhibit 6-34**, the Fourth Plain Boulevard interchange area consists of 14 study intersections, all of which currently exist.

As shown in **Exhibit 6-31**, during the morning peak, 11 of the study intersections would operate acceptably with improved, similar, or slightly degraded conditions as compared to the existing conditions. Three intersections would degrade from acceptable or unacceptable operations under existing conditions to unacceptable operations.

As shown in **Exhibit 6-32**, during the afternoon/evening peak, 13 of the study intersections would operate acceptably with improved, similar, or slightly degraded conditions. One intersection would degrade from acceptable or unacceptable operations under existing conditions to unacceptable operations under the No-Build Alternative.

As shown in **Exhibit 6-31**, during the morning peak, eight of the study intersections would operate with acceptable vehicle queuing when compared to the existing conditions. Based on 95% queuing analysis, six intersections would experience queuing extending past turn lane storage capacities or to upstream intersections, which does not occur under the existing conditions.

As shown in **Exhibit 6-32**, during the afternoon/evening peak, nine of the study intersections would operate with acceptable vehicle queuing. Based on 95% queuing analysis, five intersections would experience queuing extending past turn lane storage capacities or to upstream intersections, which does not occur under the existing conditions.

6.3.2.5 SR 500/Main Street/39th Street Interchange Area Operational Performance

The No-Build roadway network includes projects from RTC's MTP. As shown in **Exhibit 6-35**, SR 500/Main Street/39th Street interchange area consists of 10 study intersections, all of which currently exist.

As shown in **Exhibit 6-31**, during the morning peak, six of the study intersections would operate acceptably with improved, similar, or slightly degraded conditions as compared to the existing conditions. Four intersections would degrade from acceptable or unacceptable operations under existing conditions to unacceptable operations under the No-Build Alternative.

As shown in **Exhibit 6-32**, during the afternoon/evening peak, six of the study intersections would operate acceptably with improved, similar, or slightly degraded conditions as compared to the existing conditions. Four intersections would degrade from acceptable or unacceptable operations under existing conditions to unacceptable operations.

As shown in **Exhibit 6-31**, during the morning peak, five of the study intersections would operate with acceptable vehicle queuing when compared to the existing conditions. Based on 95% queuing analysis, five of the study intersections would experience queuing extending past turn lane storage capacities or to upstream intersections, which does not occur under the existing conditions.

As shown in **Exhibit 6-32**, during the afternoon/evening peak, three of the study intersections would operate with acceptable vehicle queuing when compared to the existing conditions. Based on 95% queuing analysis, seven intersections would experience queuing extending past turn lane storage capacities or to upstream intersections, which does not occur under the existing conditions.

6.3.2.6 Portland Service Levels – Morning and Afternoon/Evening Peak Hours

6.3.2.7 Hayden Island Interchange Area Operational Performance

Under the No-Build scenario, the Hayden Island interchange area roadway network would remain in the same configuration as existing conditions. As shown in **Exhibit 6-36**, the interchange area consists of two study intersections.

As shown in **Exhibit 6-37**, during the morning peak hour, both of the study intersections would operate acceptably with improved, similar, or slightly degraded conditions as compared to existing conditions.

As shown in **Exhibit 6-38**, during the afternoon/evening peak, both of the study intersections would operate acceptably with improved, similar, or slightly degraded conditions as compared to existing conditions.

As shown in **Exhibit 6-37**, during the morning peak, both intersections would operate with acceptable vehicle queuing. As shown in **Exhibit 6-38**, during the afternoon/evening peak, based on 95% queuing analysis, both of the intersections would experience queuing extending past turn lane storage capacities or to upstream intersections, which does not occur under existing conditions.

6.3.2.8 Marine Drive Interchange Area Operational Performance

Under the No-Build scenario, the Marine Drive interchange area would remain in the same configuration as existing conditions. As shown in **Exhibit 6-39**, the interchange area consists of three study intersections.

As shown in **Exhibit 6-37**, during the morning peak, all three of the study intersections would operate acceptably with improved, similar, or slightly degraded conditions as compared to existing conditions.

As shown in **Exhibit 6-38**, during the afternoon/evening peak, two of the study intersections would operate acceptably with improved, similar, or slightly degraded conditions. One intersection would degrade from acceptable operations under existing conditions to unacceptable operations under the No-Build Alternative.

As shown in **Exhibit 6-37**, during the morning peak, two of the study intersections would operate with acceptable vehicle queuing. Based on 95% queuing analysis, one intersection would experience queuing extending past turn lane storage capacities or to upstream intersections, which does not occur under existing conditions.

As shown in **Exhibit 6-38**, during the afternoon/evening peak, based on 95% queuing analysis, all three of the study intersections would experience queuing extending past turn lane storage capacities or to upstream intersections, which does not occur under existing conditions.

6.3.2.9 Victory Boulevard Interchange Area Operational Performance

Under the No-Build scenario, the Victory Boulevard interchange area would remain in the same configuration as existing conditions. As shown in **Exhibit 6-40**, the interchange area consists of four study intersections.

As shown in **Exhibit 6-37**, during the morning peak, all four of the study intersections would operate acceptably with improved, similar, or slightly degraded conditions as compared to existing conditions.

As shown in **Exhibit 6-38**, during the afternoon/evening peak, three of the study intersections would operate acceptably with improved, similar, or slightly degraded conditions as compared to existing conditions. The intersection of Interstate Avenue and Argyle Street would degrade from acceptable or unacceptable operations under existing conditions to unacceptable operations under the No-Build Alternative. This is caused because of the downstream congestion from I-5 in the vicinity of the Denver/Victory northbound on-ramp. The vehicle queue extends back from the Denver/Victory on-ramp merge with I-5, through the ramp meter, along Interstate Avenue and back into the intersection with Argyle Street, which results in LOS ‘F’ at that intersection.

As shown in **Exhibit 6-37**, during the morning peak, three of the study intersections would operate with acceptable vehicle queuing as compared to existing conditions. Based on 95% queuing analysis, one intersection would experience queuing extending past turn lane storage capacities or to upstream intersections, which does not occur under existing conditions.

As shown in **Exhibit 6-38**, during the afternoon/evening peak, one of the study intersections would operate with acceptable vehicle queuing. Based on 95% queuing analysis, three intersections would experience queuing extending past turn lane storage capacities or to upstream intersections, which does not occur under existing conditions.

6.3.2.10 Interstate Avenue Analysis Area Operational Performance

Under the No-Build scenario, the Interstate Avenue analysis area would remain in the same configuration as existing conditions. As shown in **Exhibit 6-41**, the interchange area consists of four study intersections.

As shown in **Exhibit 6-37**, during the morning peak, all four of study intersections would operate acceptably with improved, similar, or slightly degraded conditions as compared to existing conditions.

As shown in **Exhibit 6-38**, during the afternoon/evening peak, three of the study intersections would operate acceptably with improved, similar, or slightly degraded conditions. One intersection would degrade from acceptable operations under existing conditions to unacceptable operations under the No-Build Alternative.

As shown in **Exhibit 6-37**, during the morning peak, one study intersections would operate with acceptable vehicle queuing. Based on 95% queuing analysis, three intersections would experience queuing extending past turn lane storage capacities or to upstream intersections, which does not occur under existing conditions.

As shown in **Exhibit 6-38**, during the afternoon/evening peak, one of the study intersections would operate with acceptable vehicle queuing as compared to existing conditions. Based on 95% queuing analysis, three intersections would experience queuing extending past turn lane storage capacities or to upstream intersections, which does not occur under existing conditions.

6.3.2.11 Martin Luther King Jr. Boulevard Analysis Area Operational Performance

Under the No-Build scenario, the Martin Luther King Jr. Boulevard analysis area would remain in the same configuration as existing conditions. As shown in **Exhibit 6-41**, the interchange area consists of five study intersections.

As shown in **Exhibit 6-37**, during the morning peak, four of the study intersections would operate acceptably with improved, similar, or slightly degraded conditions. One intersection would degrade from acceptable or unacceptable operations under existing conditions to unacceptable operations under the No-Build Alternative.

As shown in **Exhibit 6-38**, during the afternoon/evening peak, three of the study intersections would operate acceptably with improved, similar, or slightly degraded conditions, and two intersections would degrade from acceptable or unacceptable operations under existing conditions to unacceptable operations.

As shown in **Exhibit 6-37**, during the morning peak, three of the study intersections would operate with acceptable vehicle queuing. Based on 95% queuing analysis, two intersections would experience queuing extending past turn lane storage capacities or to upstream intersections, which does not occur under existing conditions.

As shown in **Exhibit 6-38**, during the afternoon/evening peak two of the study intersections would operate with acceptable vehicle queuing. Based on 95% queuing analysis, three intersections would experience queuing extending past turn lane storage capacities or to upstream intersections, which does not occur under existing conditions.

6.3.2.12 I-5 Ramp Terminals Analysis Area Operational Performance

Under the No-Build scenario, the I-5 Ramp Terminals analysis area would remain in the same configuration as existing conditions, with the exception of the Alberta Street southbound and northbound ramp terminals. These ramp terminals would be signalized and have a westbound left-turn lane at the southbound terminal, and an eastbound left-turn lane at the northbound terminal. As shown in **Exhibit 6-41**, the interchange area would continue to consist of seven study intersections.

As shown in **Exhibits 6-37 and 6-38**, during the morning and afternoon/evening peaks, all seven of the study intersections would operate acceptably with improved, similar, or slightly degraded conditions as compared to existing conditions. During the morning peak, all seven study intersections would operate with acceptable vehicle queuing.

As shown in **Exhibit 6-37**, during the morning peak, five of the study intersections would operate with acceptable vehicle queuing. Based on 95% queuing analysis, two intersections would experience queuing extending past turn lane storage capacities or to upstream intersections, which does not occur under existing conditions.

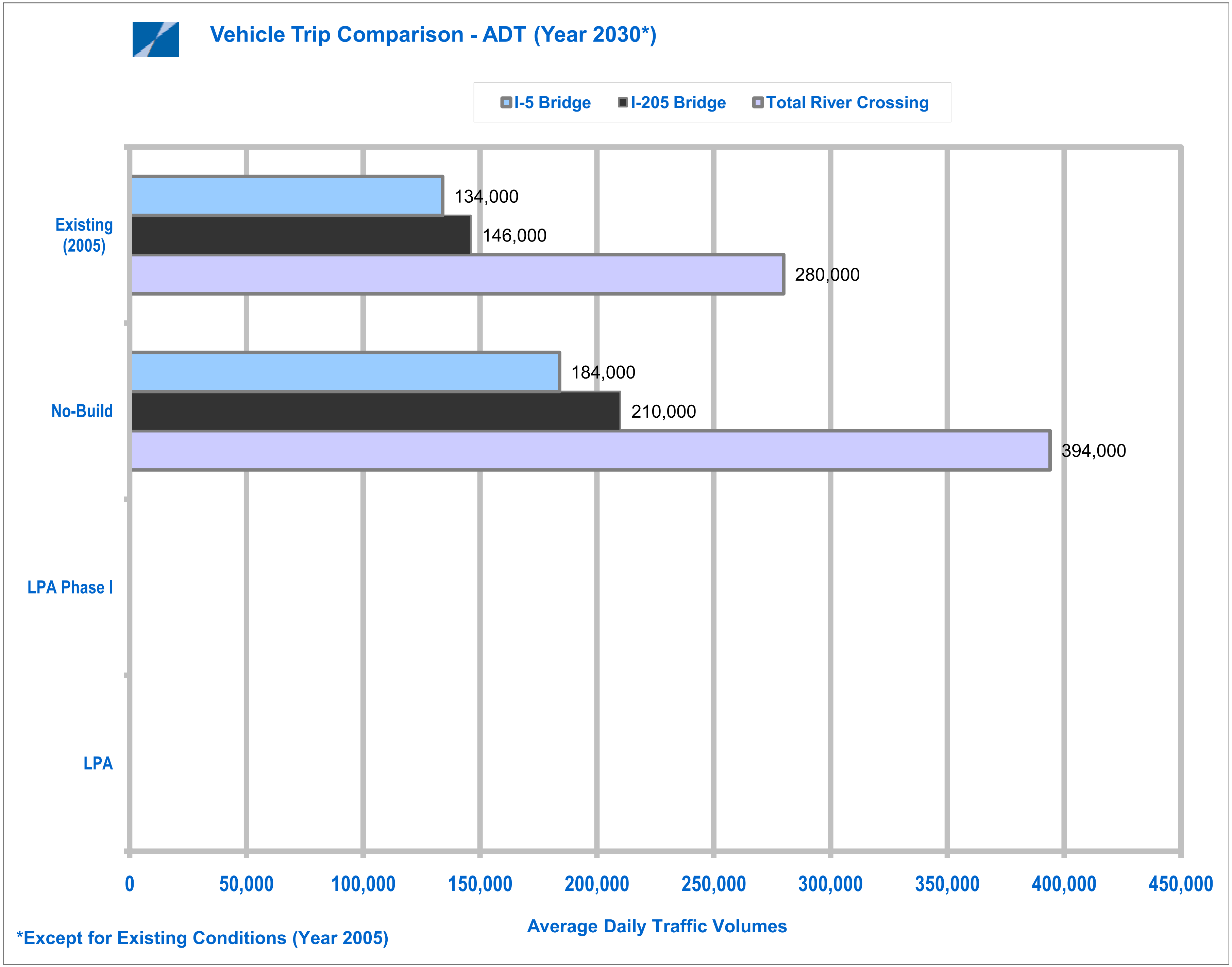
As shown in **Exhibit 6-38**, during the afternoon/evening peak, four of the study intersections would operate with acceptable vehicle queuing as compared to existing conditions. Based on 95% queuing analysis, three intersections would experience queuing extending past turn lane storage capacities or to upstream intersections, which does not occur under existing conditions.

6.4 Pedestrian and Bicycle Circulation

Although pedestrian and bicycle use for the 2030 No-Build Alternative has not been estimated, pedestrian and bicycle trips across the Columbia River are expected to increase as traffic congestion worsens and only limited transit service improvements are provided.

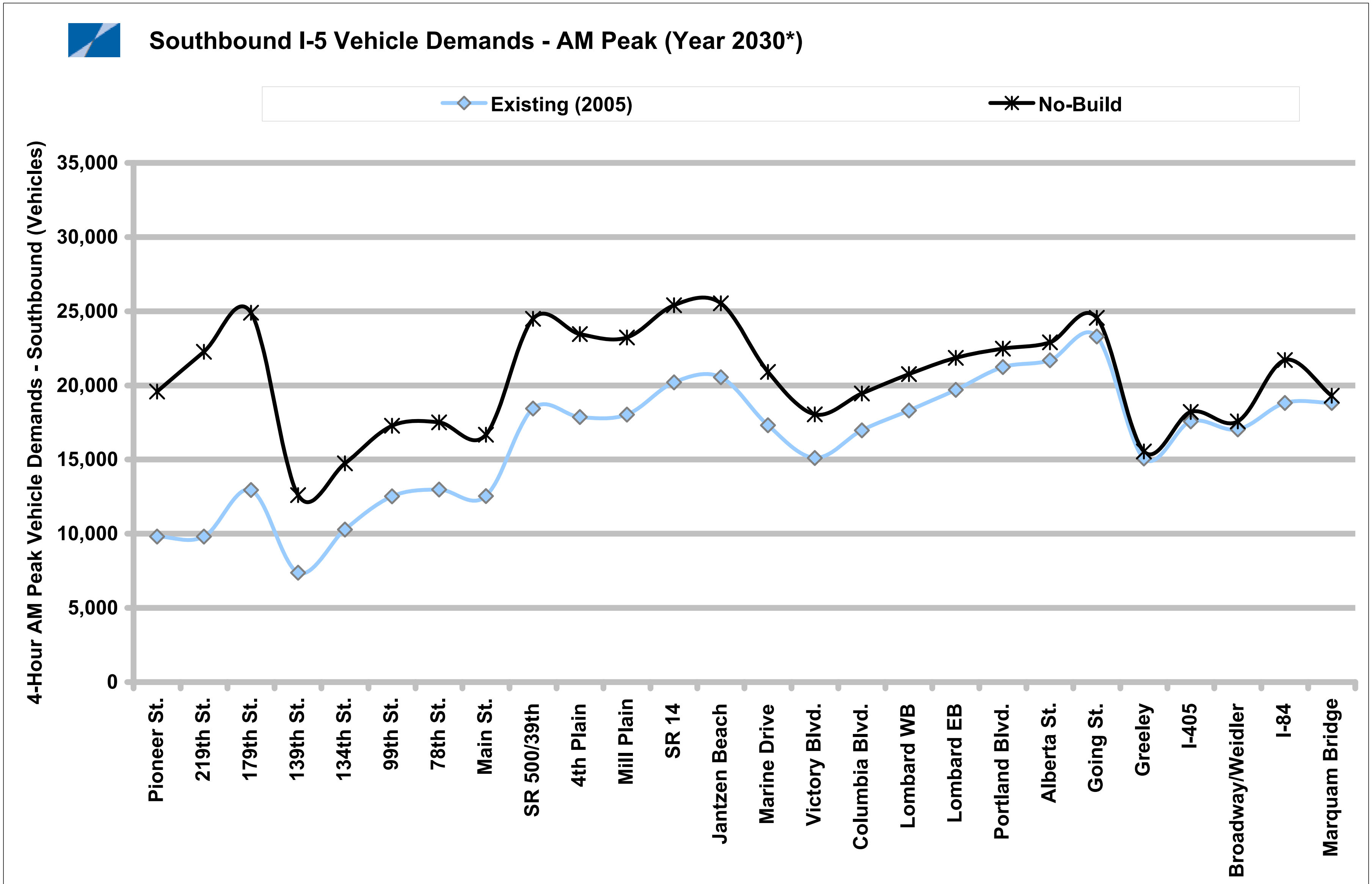
Under the No-Build Alternative, an increased number of pedestrians and bicyclists would face the same or more difficult conditions when crossing the Columbia River. Along the narrow sidewalks, increased conflicts would arise between pedestrians and other pedestrians, pedestrians and bicyclists, and bicyclists and other bicyclists. In addition, increased conflicts would result when pedestrians and bicyclists interact with motor vehicles, such as when accessing the Interstate Bridge or Portland Harbor Bridge in Vancouver, on Hayden Island, or in the Marine Drive interchange area.

Exhibit 6-1



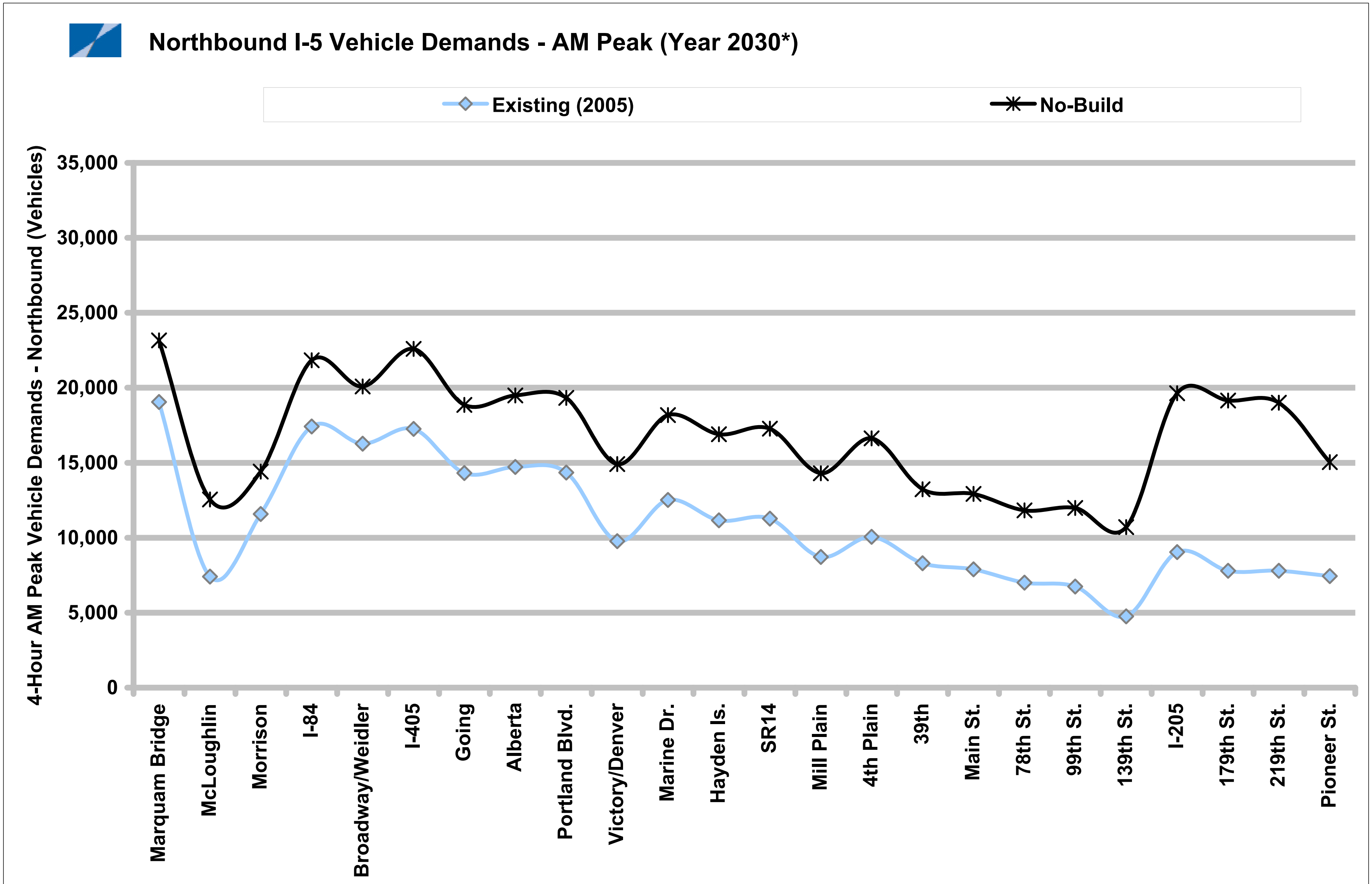
Vehicle Trip Comparison - ADT (Year 2030*)
I-5 Bridge
I-205 Bridge
Total River Crossing
Existing (2005)
No-Build
LPA Phase I
LPA
134,000
146,000
280,000
184,000
210,000
394,000
0
50,000
100,000
150,000
200,000
250,000
300,000
350,000
400,000
450,000
Average Daily Traffic Volumes
*Except for Existing Conditions (Year 2005)

Exhibit 6-2



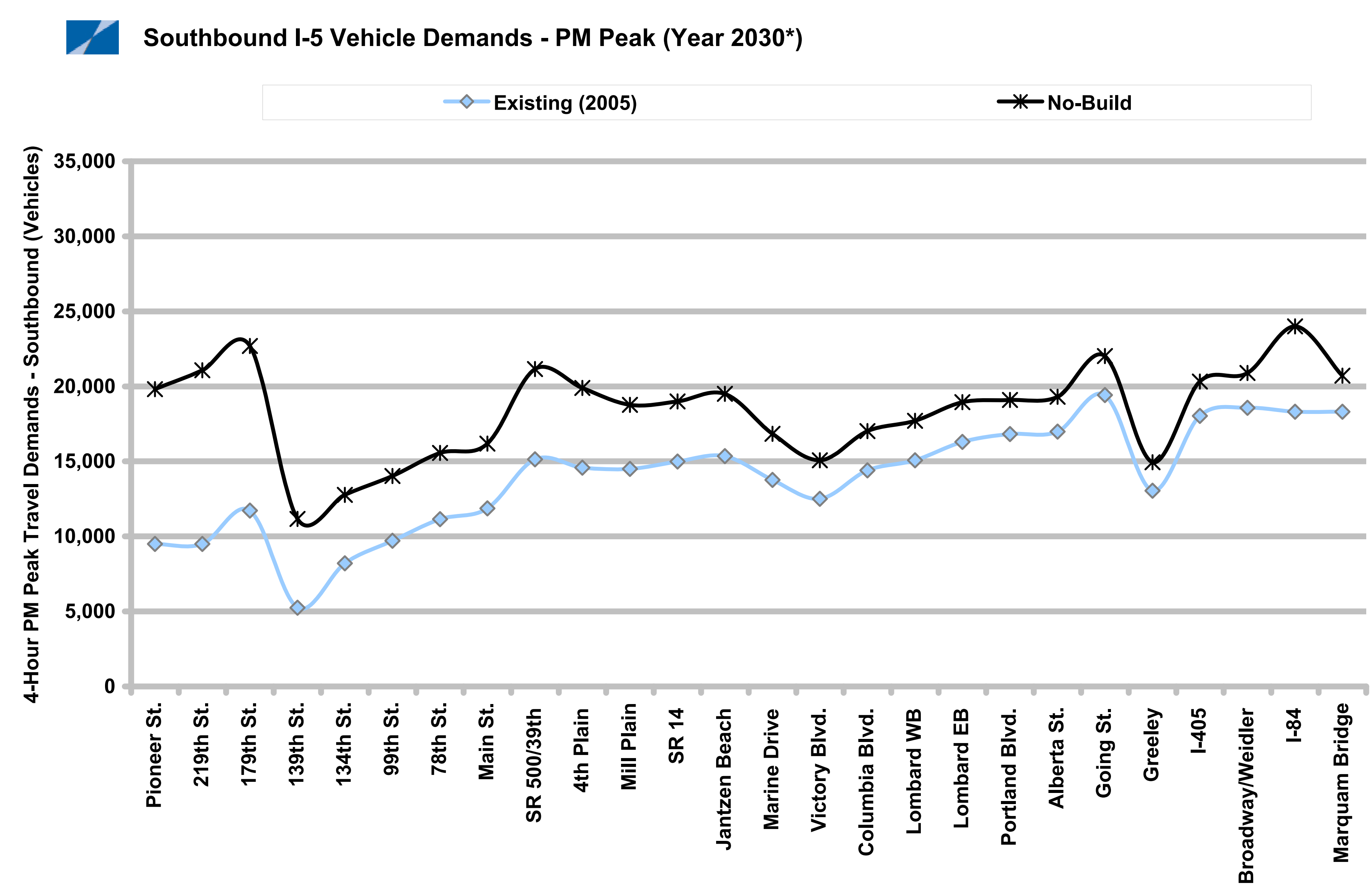
*Except for Existing Conditions (Year 2005)

Exhibit 6-3



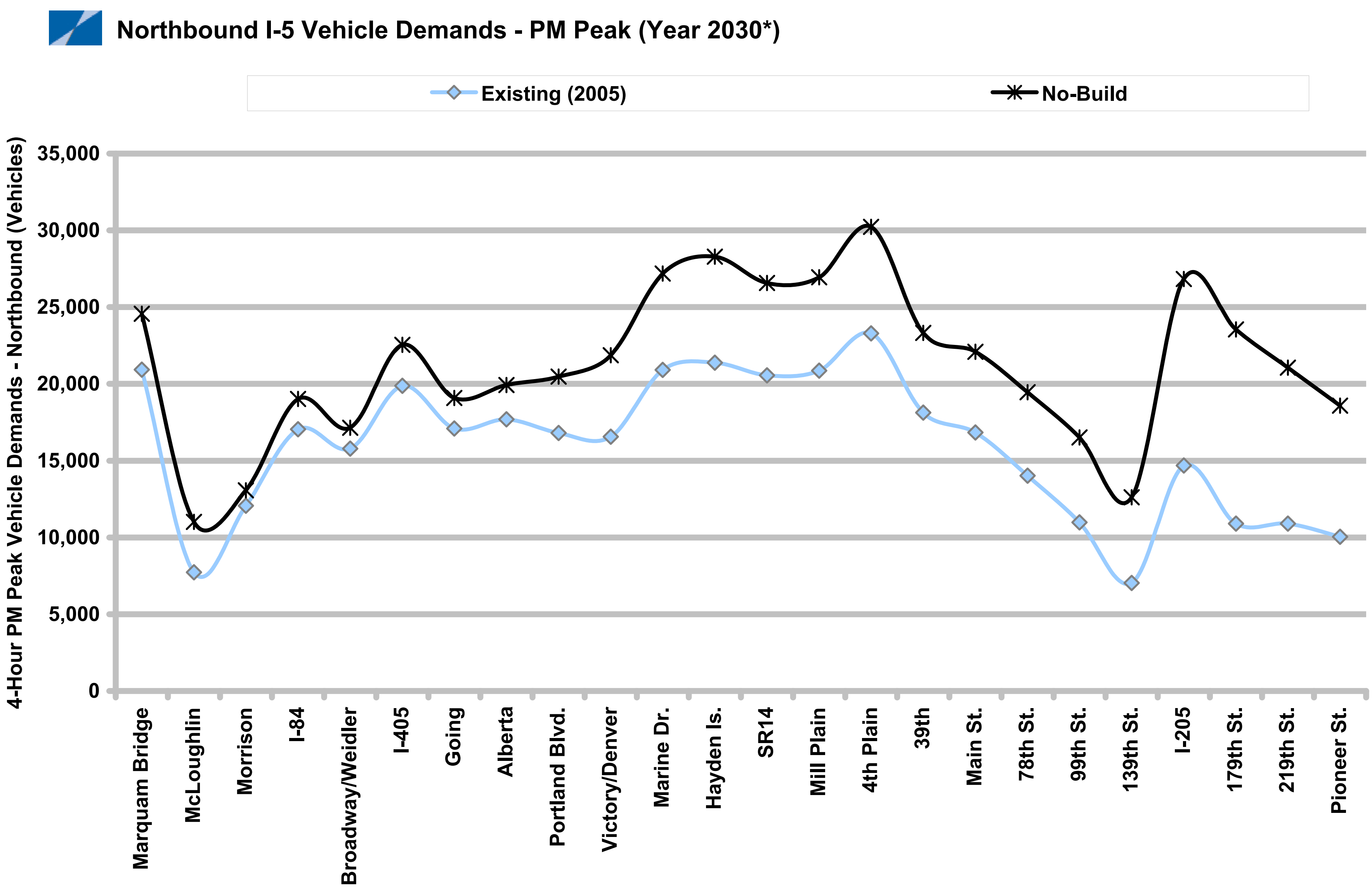
*Except for Existing Conditions (Year 2005)

Exhibit 6-4



*Except for Existing Conditions (Year 2005)

Exhibit 6-5



*Except for Existing Conditions (Year 2005)

Exhibit 6-6

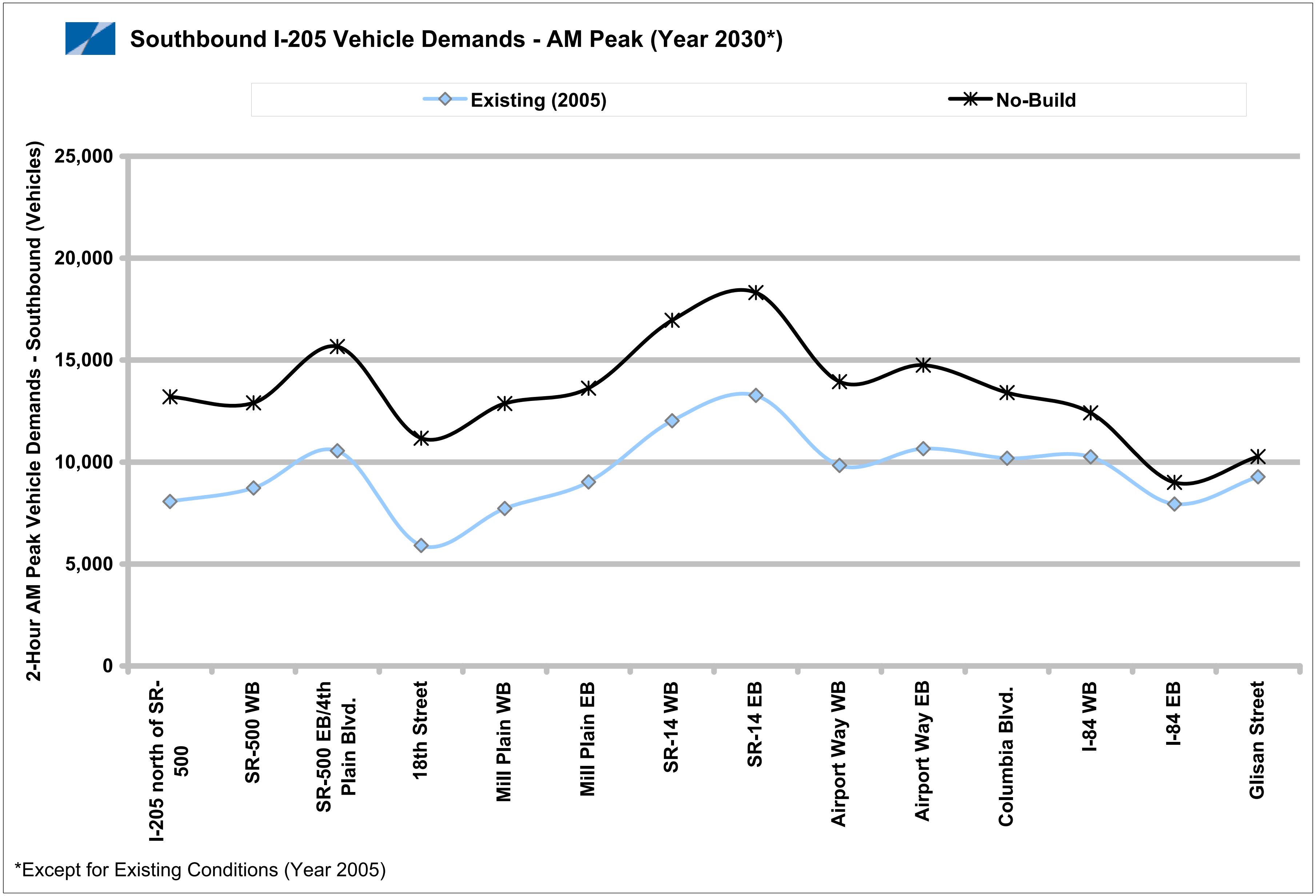
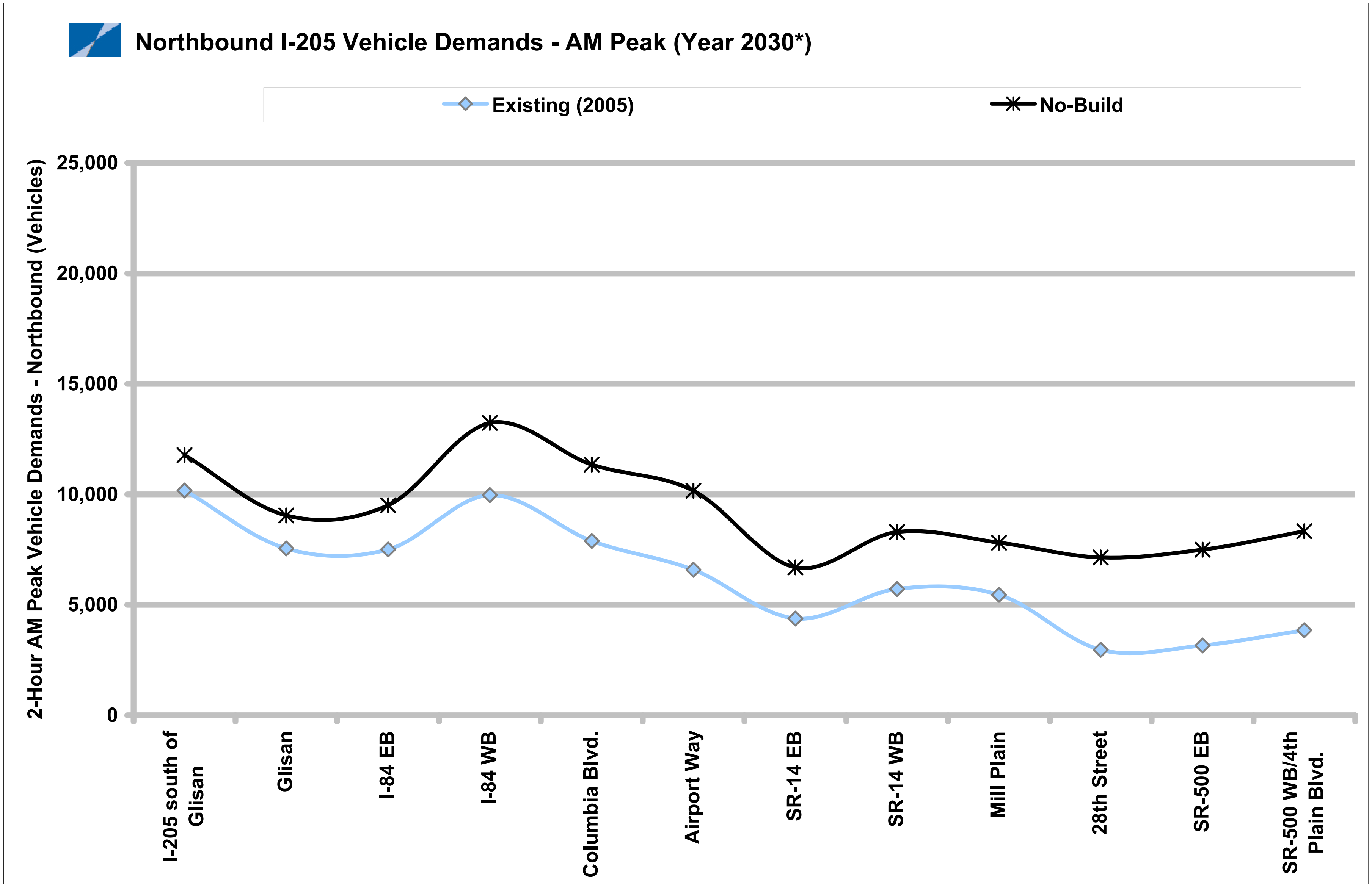
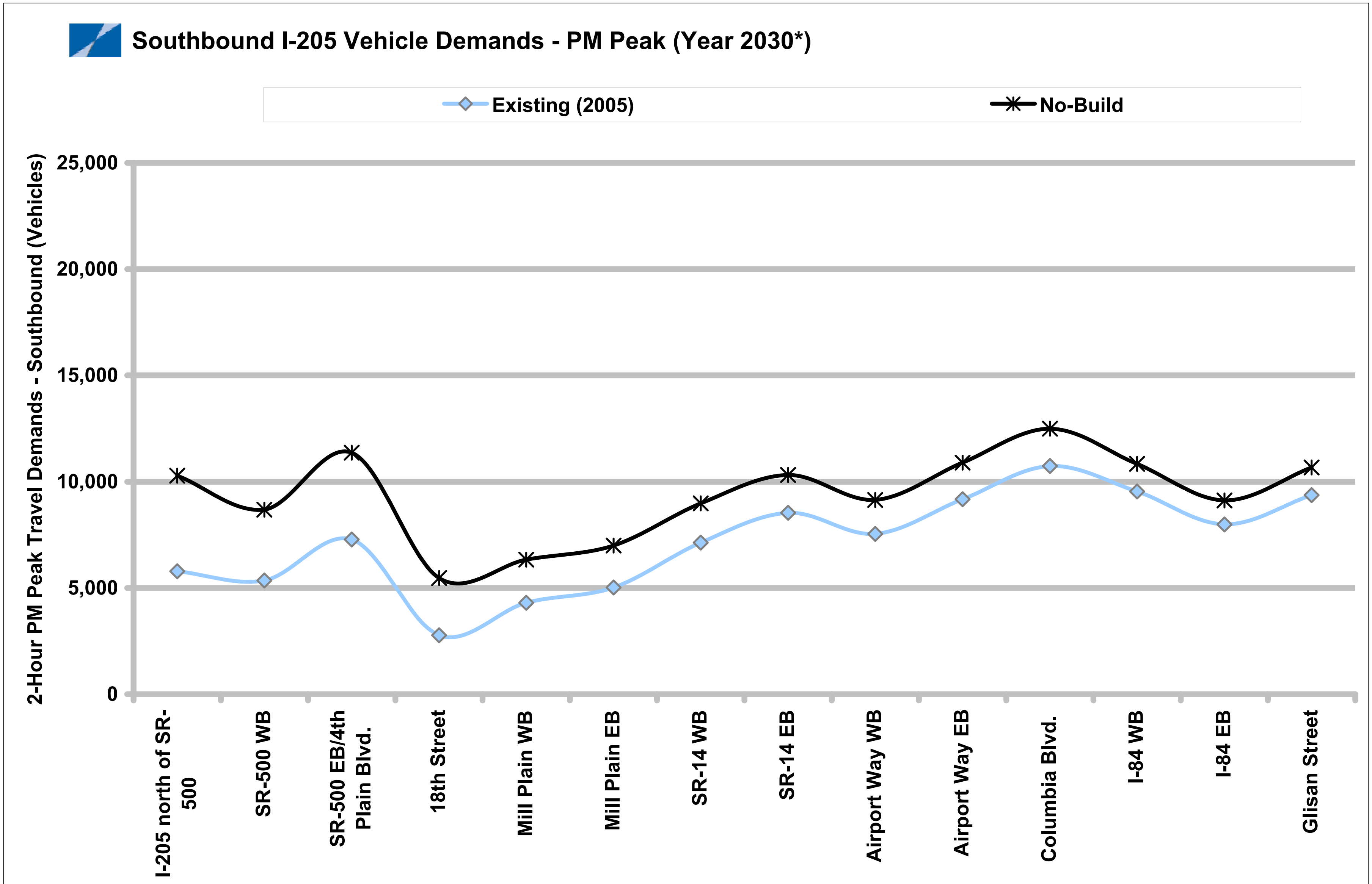

Southbound I-205 Vehicle Demands - AM Peak (Year 2030*)
Existing (2005)
No-Build
2-Hour AM Peak Vehicle Demands - Southbound (Vehicles)
25,000
20,000
15,000
10,000
5,000
0
I-205 north of SR-500
SR-500 WB
SR-500 EB/4th Plain Blvd.
18th Street
Mill Plain WB
Mill Plain EB
SR-14 WB
SR-14 EB
Airport Way WB
Airport Way EB
Columbia Blvd.
I-84 WB
I-84 EB
Glisan Street
*Except for Existing Conditions (Year 2005)

Exhibit 6-7



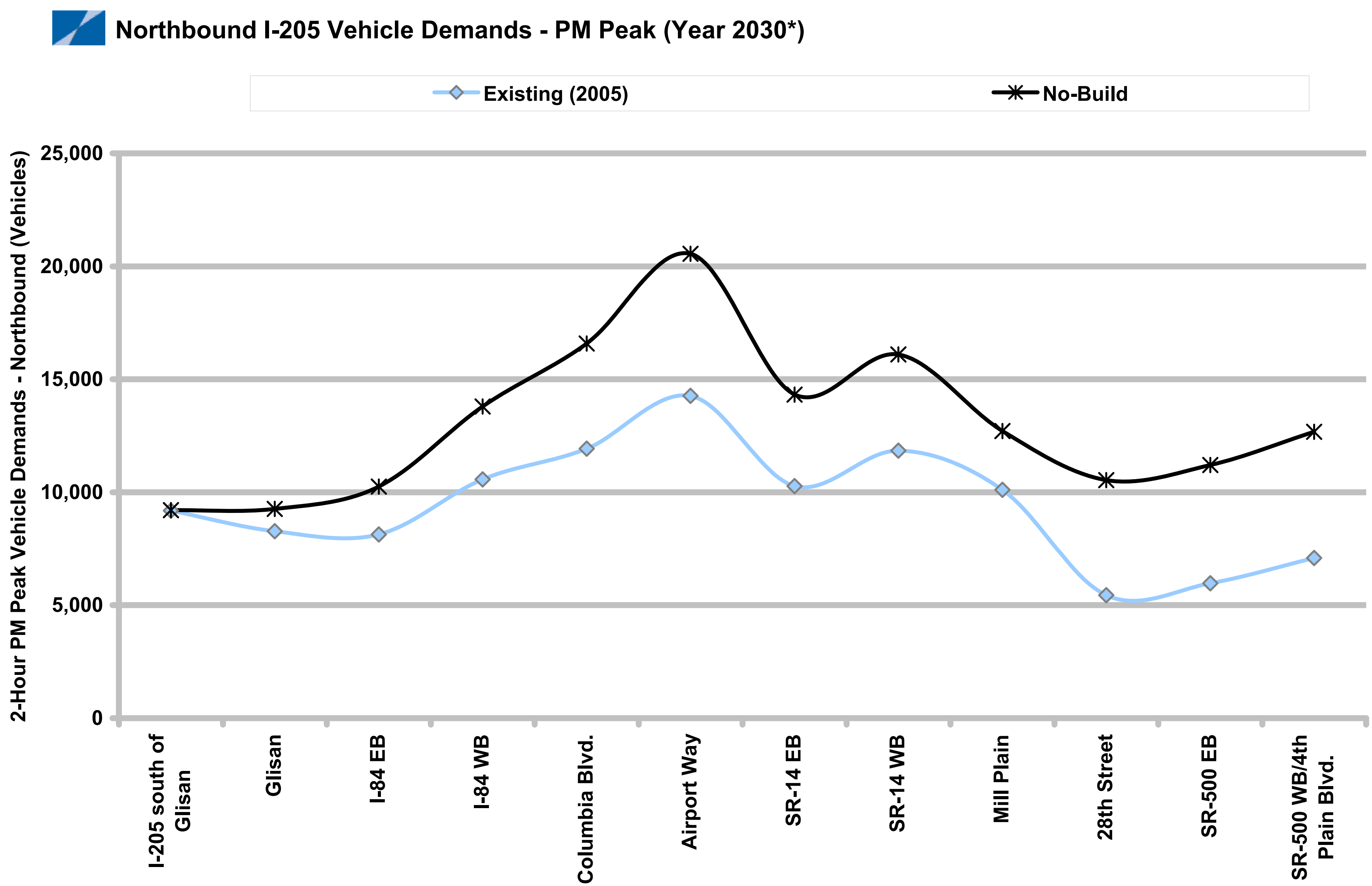
*Except for Existing Conditions (Year 2005)

Exhibit 6-8



*Except for Existing Conditions (Year 2005)

Exhibit 6-9



*Except for Existing Conditions (Year 2005)

Exhibit 6-10

Portland-Vancouver Region Freight Cargo Forecasts by Mode					
	Year 2000 Volume		Year 2030 Volume		2000-2030
Mode	**Tons (millions)**	**Market Share**	**Tons (millions)**	**Market Share**	**Growth Rate**
Truck	197.2	67%	390.5	73%	2.3% / year
Rail	32.9	11%	50.9	10%	1.5% / year
Ocean	28.4	10%	40.3	8%	1.2% / year
Barge	15.1	5%	19.8	4%	0.9% / year
Pipeline	22.2	7%	28.8	5%	0.9% / year
Air	0.4	< 1 percent	1.3	< 1 percent	4.0% / year
TOTAL	**296.2**	**100%**	**531.6**	**100%**	**2.0% / year**

Source: Portland/Vancouver International and Domestic Trade Capacity Analysis 2006. Provided by Metro Planning Department, Deena Platman, Senior Transportation Planner, August 22, 2007.

Exhibit 6-11

Peak Period 2030 I-5 Truck Volume - 2030 No-Build				
	Existing 2005		2030 No-Build	
Hours	**Southbound**	**Northbound**	**Southbound**	**Northbound**
AM Peak Period 6 AM - 10 AM	1,015	1,120	1,140	2,195
Midday Peak Period 10 AM - 3 PM	1,945	1,880	3,525	2,900
PM Peak Period 3 PM - 7 PM	1,020	925	2,350	1,635
Night 7 PM - 6 AM	1,570	1,500	2,790	2,870
Daily Total	**5,550**	**5,425**	**9,805**	**9,600**

Source: Portland/Vancouver International and Domestic Trade Capacity Analysis, 2006 and CRC Project, September 2007

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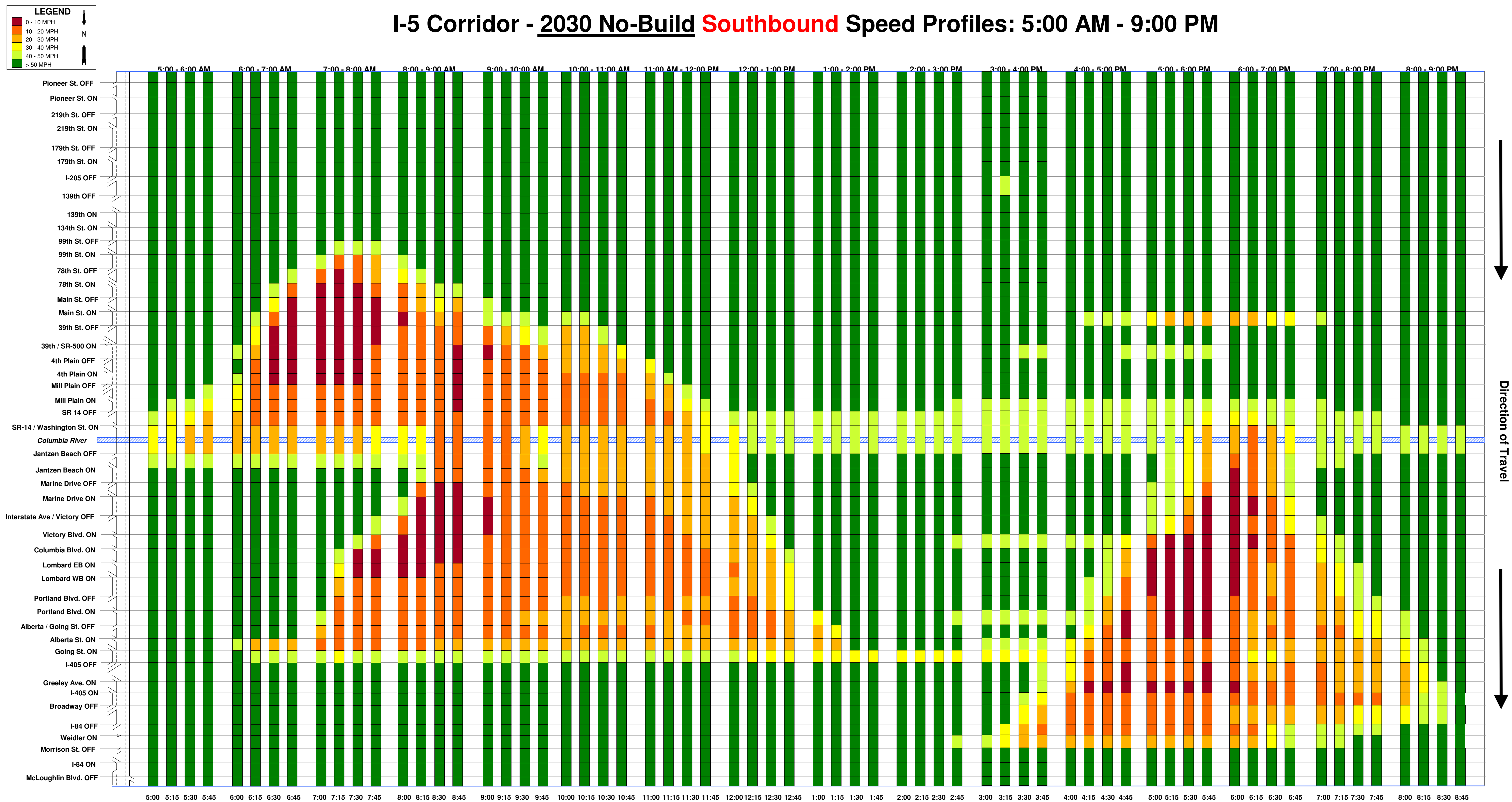
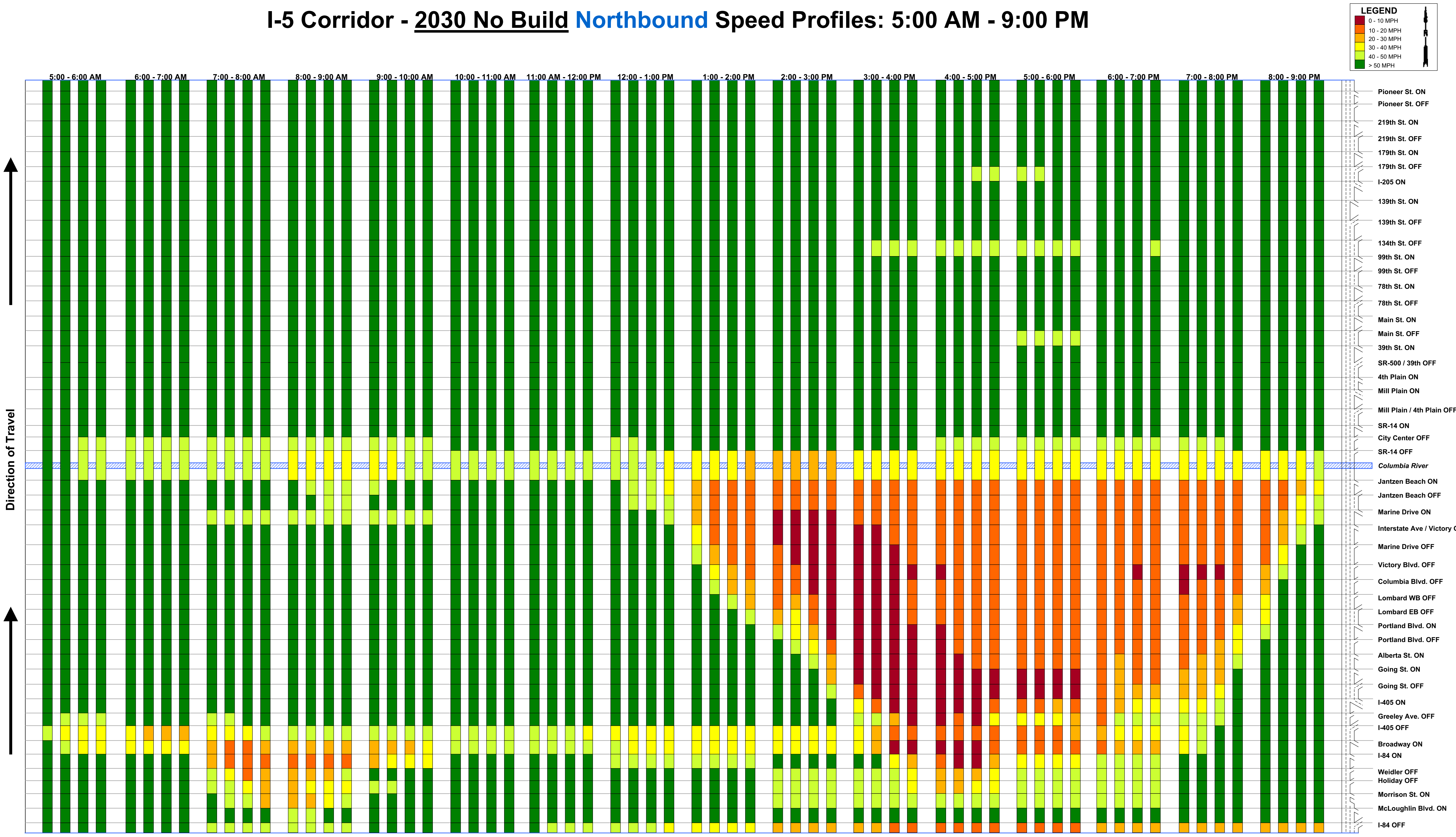
Exhibit 6-12



I-5 Corridor - 2030 No-Build Southbound Speed Profiles: 5:00 AM - 9:00 PM
LEGEND
0 - 10 MPH
10 - 20 MPH
20 - 30 MPH
30 - 40 MPH
40 - 50 MPH
> 50 MPH
5:00 - 6:00 AM
6:00 - 7:00 AM
7:00 - 8:00 AM
8:00 - 9:00 AM
9:00 - 10:00 AM
10:00 - 11:00 AM
11:00 AM - 12:00 PM
12:00 - 1:00 PM
1:00 - 2:00 PM
2:00 - 3:00 PM
3:00 - 4:00 PM
4:00 - 5:00 PM
5:00 - 6:00 PM
6:00 - 7:00 PM
7:00 - 8:00 PM
8:00 - 9:00 PM
Pioneer St. OFF
Pioneer St. ON
219th St. OFF
219th St. ON
179th St. OFF
179th St. ON
I-205 OFF
139th OFF
139th ON
134th St. ON
99th St. OFF
99th St. ON
78th St. OFF
78th St. ON
Main St. OFF
Main St. ON
39th St. OFF
39th / SR-500 ON
4th Plain OFF
4th Plain ON
Mill Plain OFF
Mill Plain ON
SR 14 OFF
SR-14 / Washington St. ON
Columbia River
Jantzen Beach OFF
Jantzen Beach ON
Marine Drive OFF
Marine Drive ON
Interstate Ave / Victory OFF
Victory Blvd. ON
Columbia Blvd. ON
Lombard EB ON
Lombard WB ON
Portland Blvd. OFF
Portland Blvd. ON
Alberta / Going St. OFF
Alberta St. ON
Going St. ON
I-405 OFF
Greeley Ave. ON
I-405 ON
Broadway OFF
I-84 OFF
Weidler ON
Morrison St. OFF
I-84 ON
McLoughlin Blvd. OFF
5:00 5:15 5:30 5:45 6:00 6:15 6:30 6:45 7:00 7:15 7:30 7:45 8:00 8:15 8:30 8:45 9:00 9:15 9:30 9:45 10:00 10:15 10:30 10:45 11:00 11:15 11:30 11:45 12:00 12:15 12:30 12:45 1:00 1:15 1:30 1:45 2:00 2:15 2:30 2:45 3:00 3:15 3:30 3:45 4:00 4:15 4:30 4:45 5:00 5:15 5:30 5:45 6:00 6:15 6:30 6:45 7:00 7:15 7:30 7:45 8:00 8:15 8:30 8:45
Direction of Travel

Exhibit 6-13



I-5 Corridor - 2030 No Build Northbound Speed Profiles: 5:00 AM - 9:00 PM
LEGEND
0 - 10 MPH
10 - 20 MPH
20 - 30 MPH
30 - 40 MPH
40 - 50 MPH
> 50 MPH
N
5:00 - 6:00 AM
6:00 - 7:00 AM
7:00 - 8:00 AM
8:00 - 9:00 AM
9:00 - 10:00 AM
10:00 - 11:00 AM
11:00 AM - 12:00 PM
12:00 - 1:00 PM
1:00 - 2:00 PM
2:00 - 3:00 PM
3:00 - 4:00 PM
4:00 - 5:00 PM
5:00 - 6:00 PM
6:00 - 7:00 PM
7:00 - 8:00 PM
8:00 - 9:00 PM
Direction of Travel
Pioneer St. ON
Pioneer St. OFF
219th St. ON
219th St. OFF
179th St. ON
179th St. OFF
I-205 ON
139th St. ON
139th St. OFF
134th St. OFF
99th St. ON
99th St. OFF
78th St. ON
78th St. OFF
Main St. ON
Main St. OFF
39th St. ON
SR-500 / 39th OFF
4th Plain ON
Mill Plain ON
Mill Plain / 4th Plain OFF
SR-14 ON
City Center OFF
SR-14 OFF
Columbia River
Jantzen Beach ON
Jantzen Beach OFF
Marine Drive ON
Interstate Ave / Victory ON
Marine Drive OFF
Victory Blvd. OFF
Columbia Blvd. OFF
Lombard WB OFF
Lombard EB OFF
Portland Blvd. ON
Portland Blvd. OFF
Alberta St. ON
Going St. ON
Going St. OFF
I-405 ON
Greeley Ave. OFF
I-405 OFF
Broadway ON
I-84 ON
Weidler OFF
Holiday OFF
Morrison St. ON
McLoughlin Blvd. ON
I-84 OFF
5:00 5:15 5:30 5:45
6:00 6:15 6:30 6:45
7:00 7:15 7:30 7:45
8:00 8:15 8:30 8:45
9:00 9:15 9:30 9:45
10:00 10:15 10:30 10:45
11:00 11:15 11:30 11:45
12:00 12:15 12:30 12:45
1:00 1:15 1:30 1:45
2:00 2:15 2:30 2:45
3:00 3:15 3:30 3:45
4:00 4:15 4:30 4:45
5:00 5:15 5:30 5:45
6:00 6:15 6:30 6:45
7:00 7:15 7:30 7:45
8:00 8:15 8:30 8:45

Exhibit 6-14

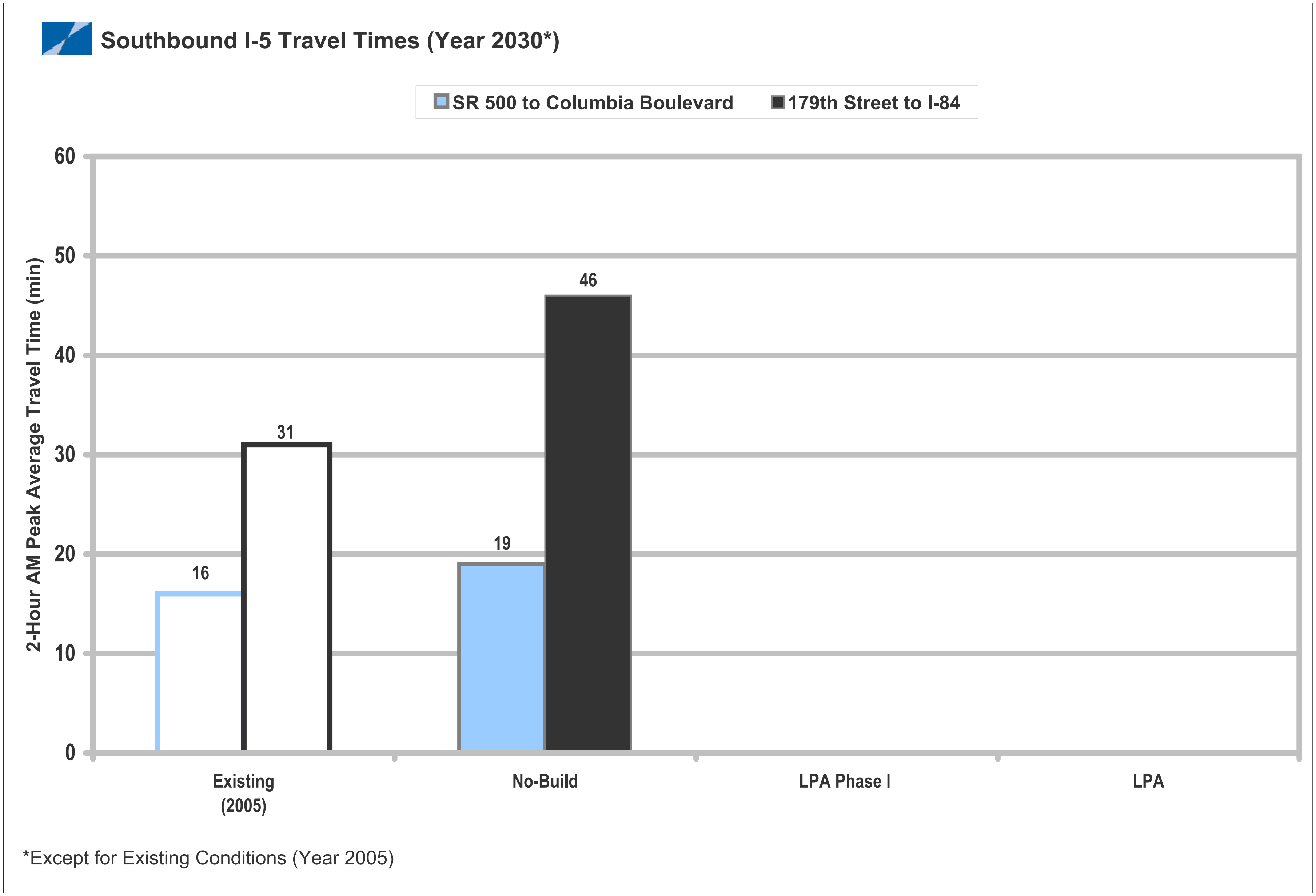

Southbound I-5 Travel Times (Year 2030*)
SR 500 to Columbia Boulevard
179th Street to I-84
2-Hour AM Peak Average Travel Time (min)
60
50
40
30
20
10
0
16
31
19
46
Existing (2005)
No-Build
LPA Phase I
LPA
*Except for Existing Conditions (Year 2005)

Exhibit 6-15

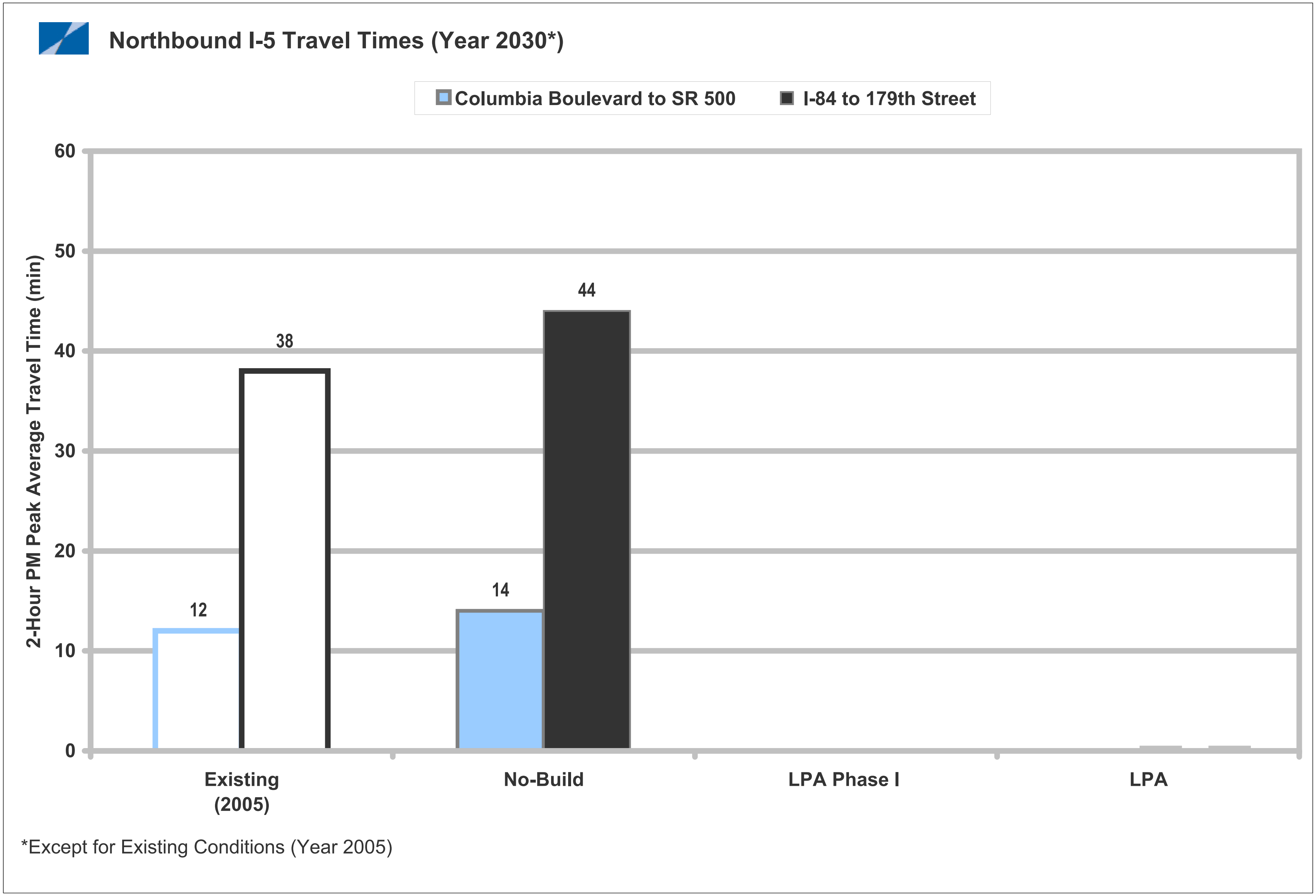
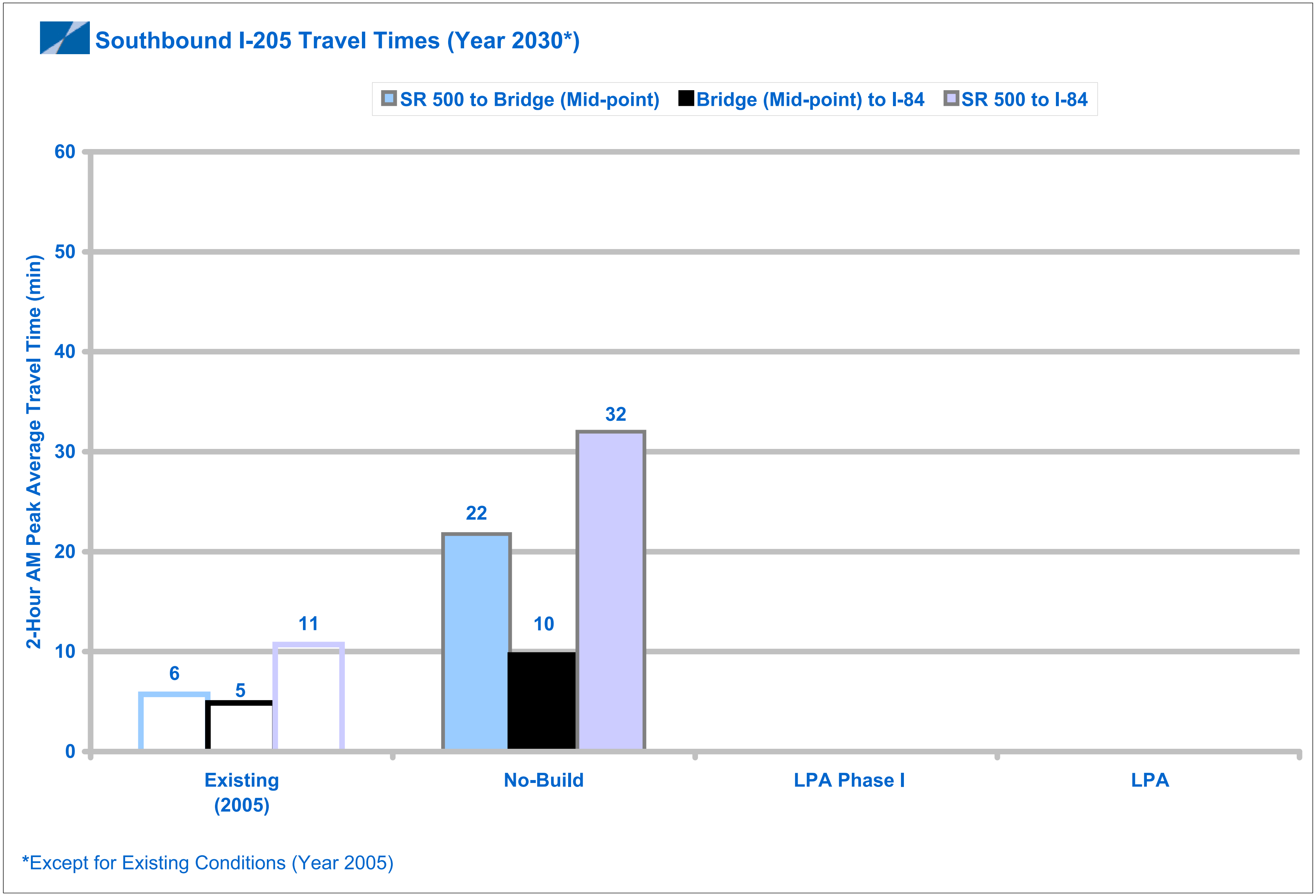
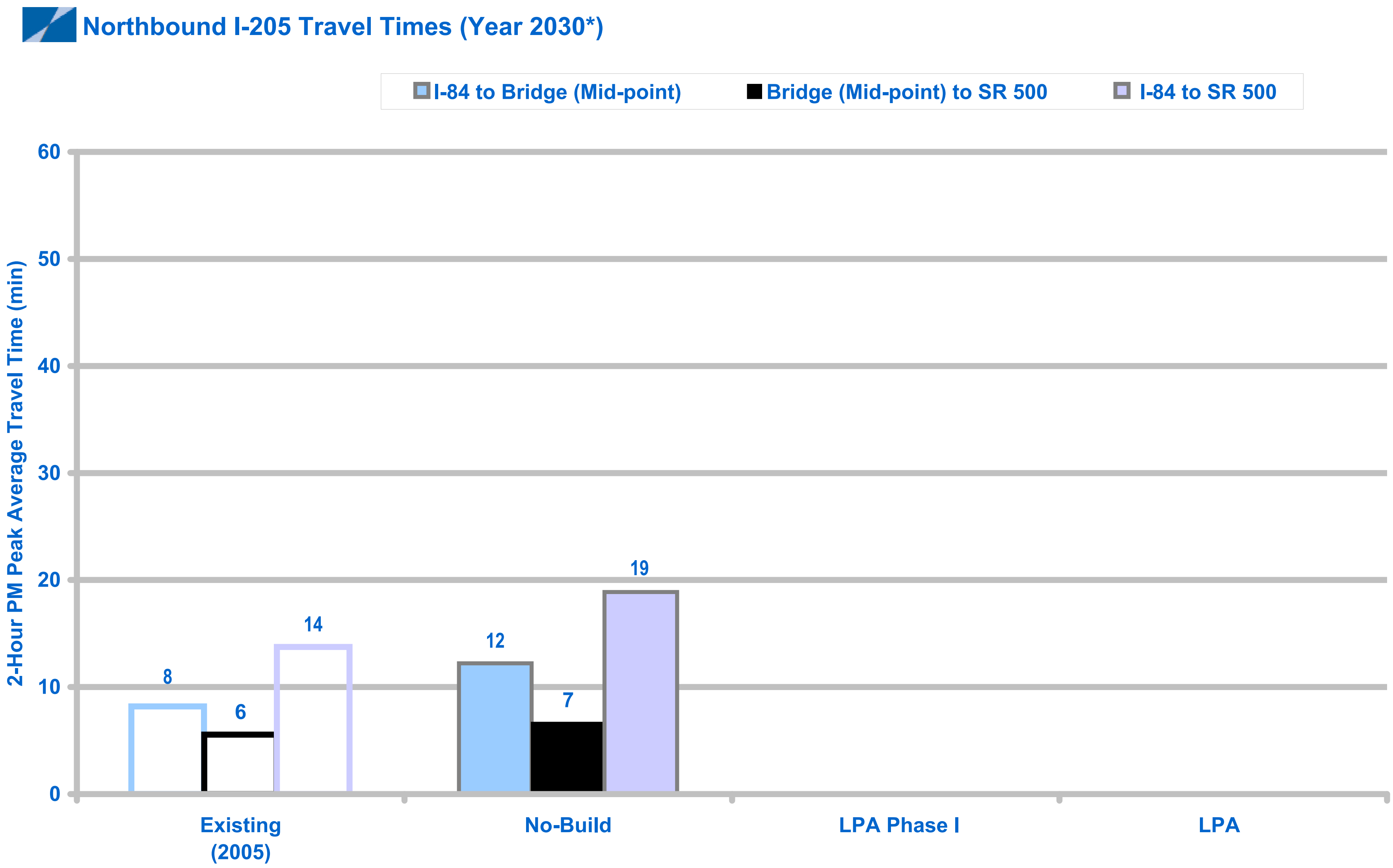

Northbound I-5 Travel Times (Year 2030*)
Columbia Boulevard to SR 500
I-84 to 179th Street
2-Hour PM Peak Average Travel Time (min)
60
50
40
30
20
10
0
12
38
14
44
Existing (2005)
No-Build
LPA Phase I
LPA
*Except for Existing Conditions (Year 2005)

Exhibit 6-16



Southbound I-205 Travel Times (Year 2030*)
SR 500 to Bridge (Mid-point)
Bridge (Mid-point) to I-84
SR 500 to I-84
2-Hour AM Peak Average Travel Time (min)
60
50
40
30
20
10
0
6
5
11
22
10
32
Existing (2005)
No-Build
LPA Phase I
LPA
*Except for Existing Conditions (Year 2005)

Exhibit 6-17



*Except for Existing Conditions (Year 2005)

Exhibit 6-18

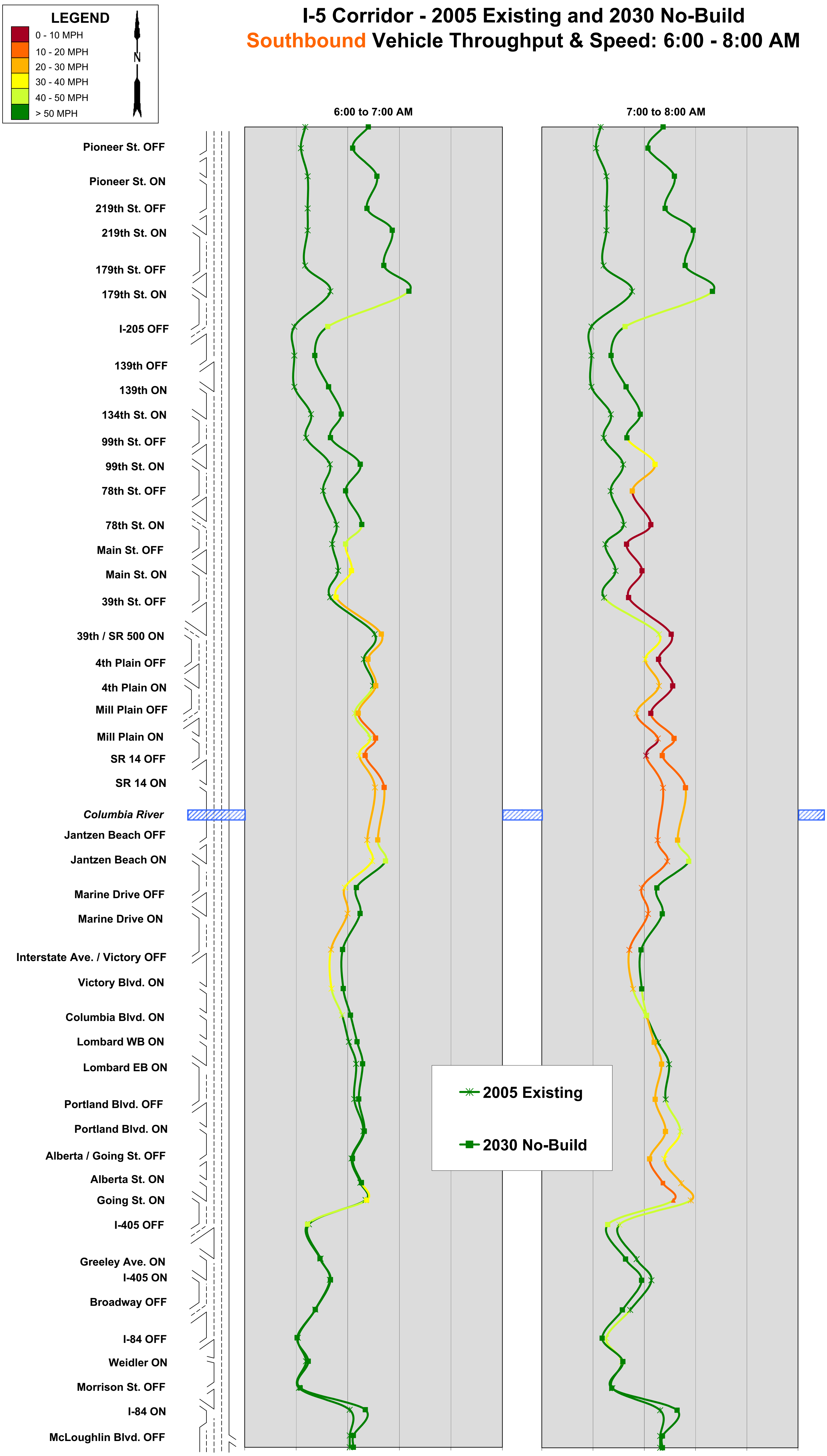


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Exhibit 6-18 - Continued

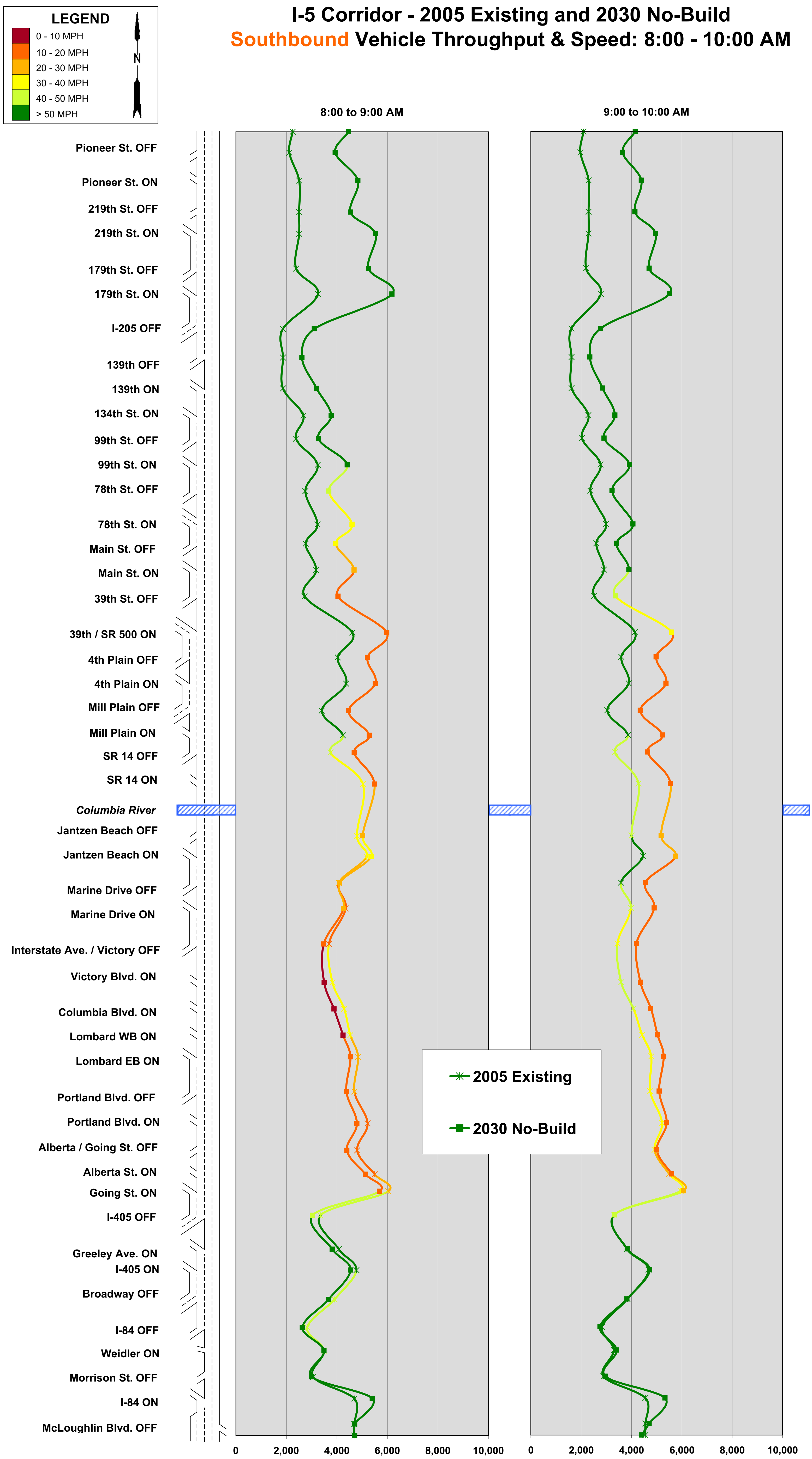

Exhibit 6-19

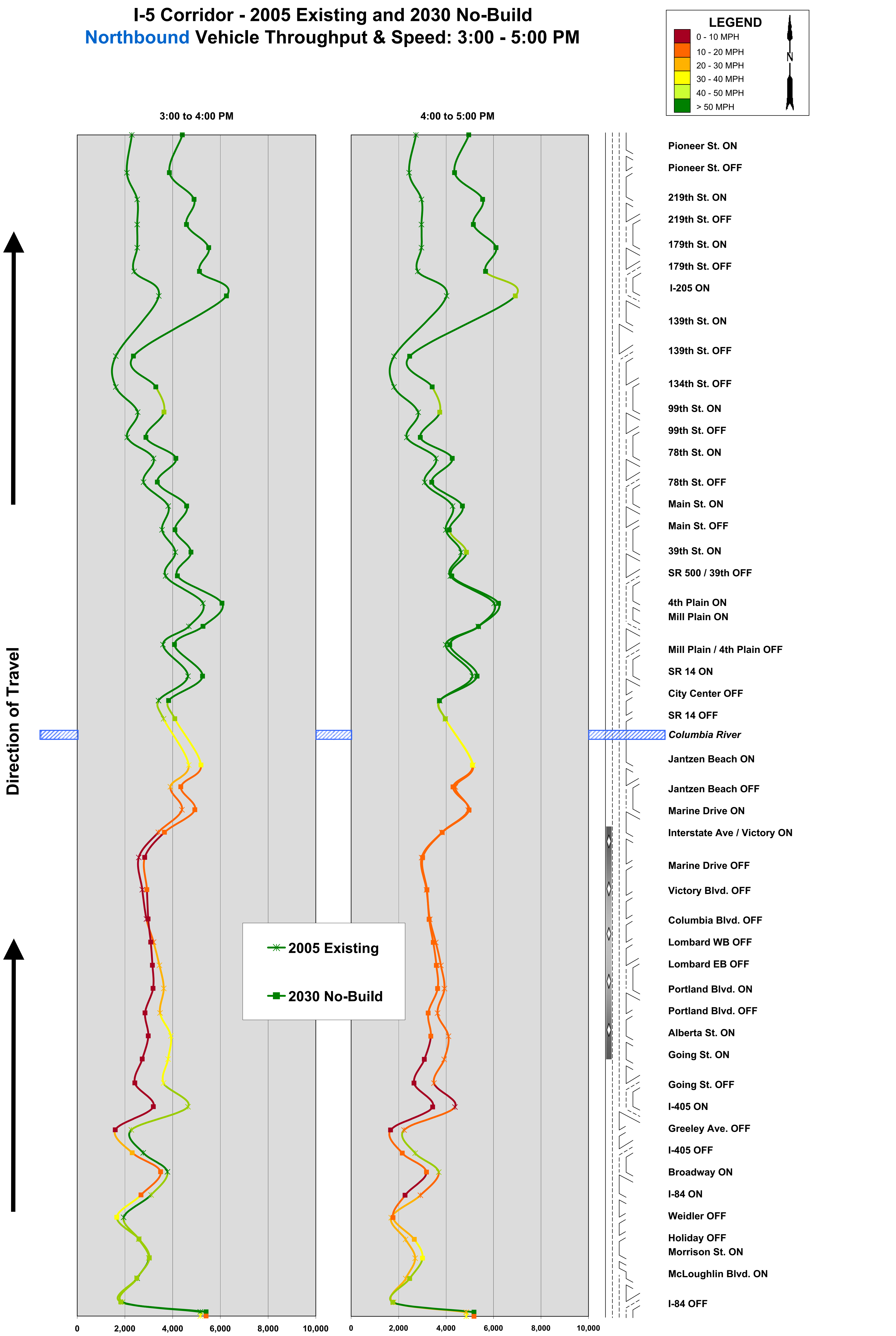

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Exhibit 6-19 - Continued

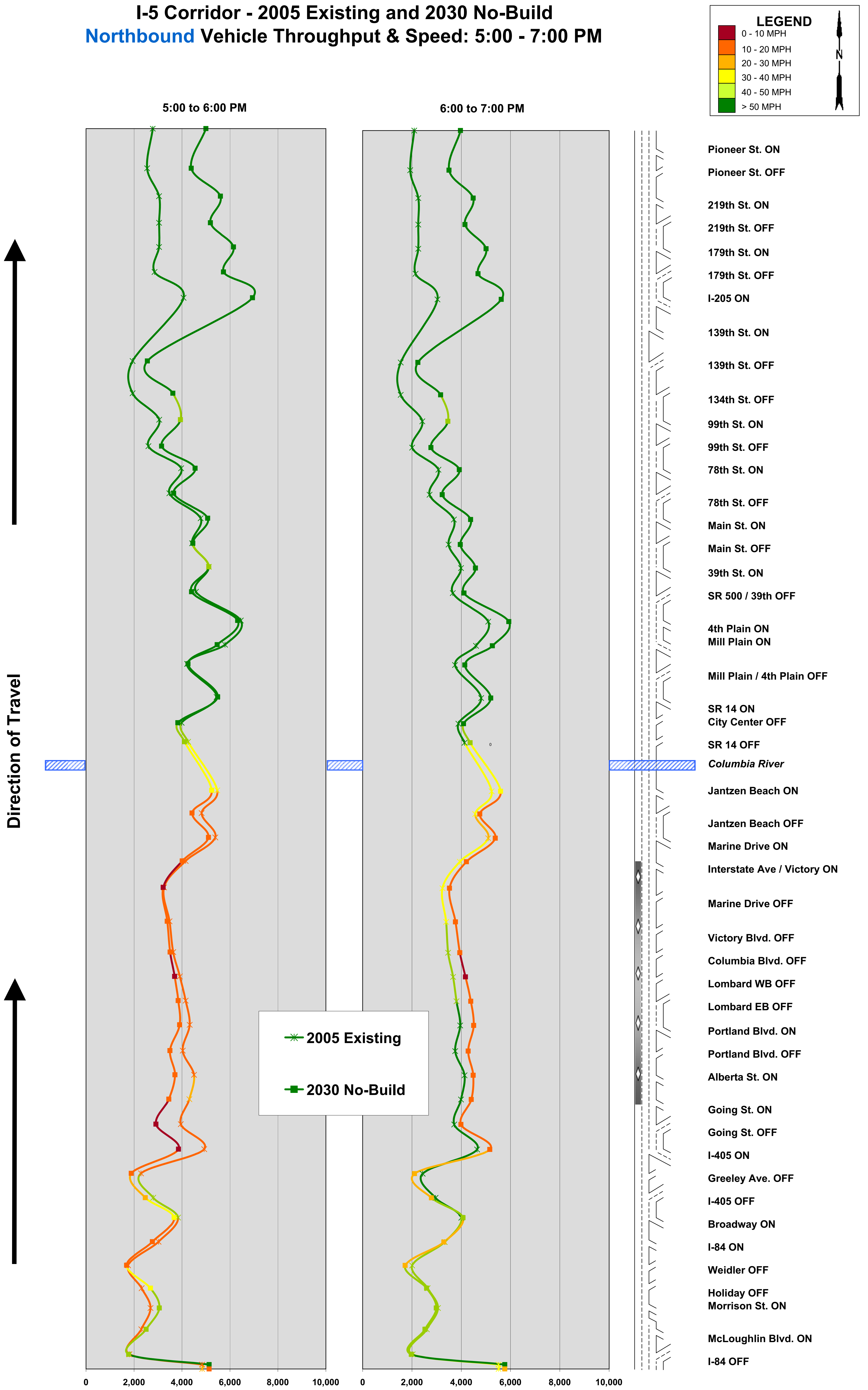
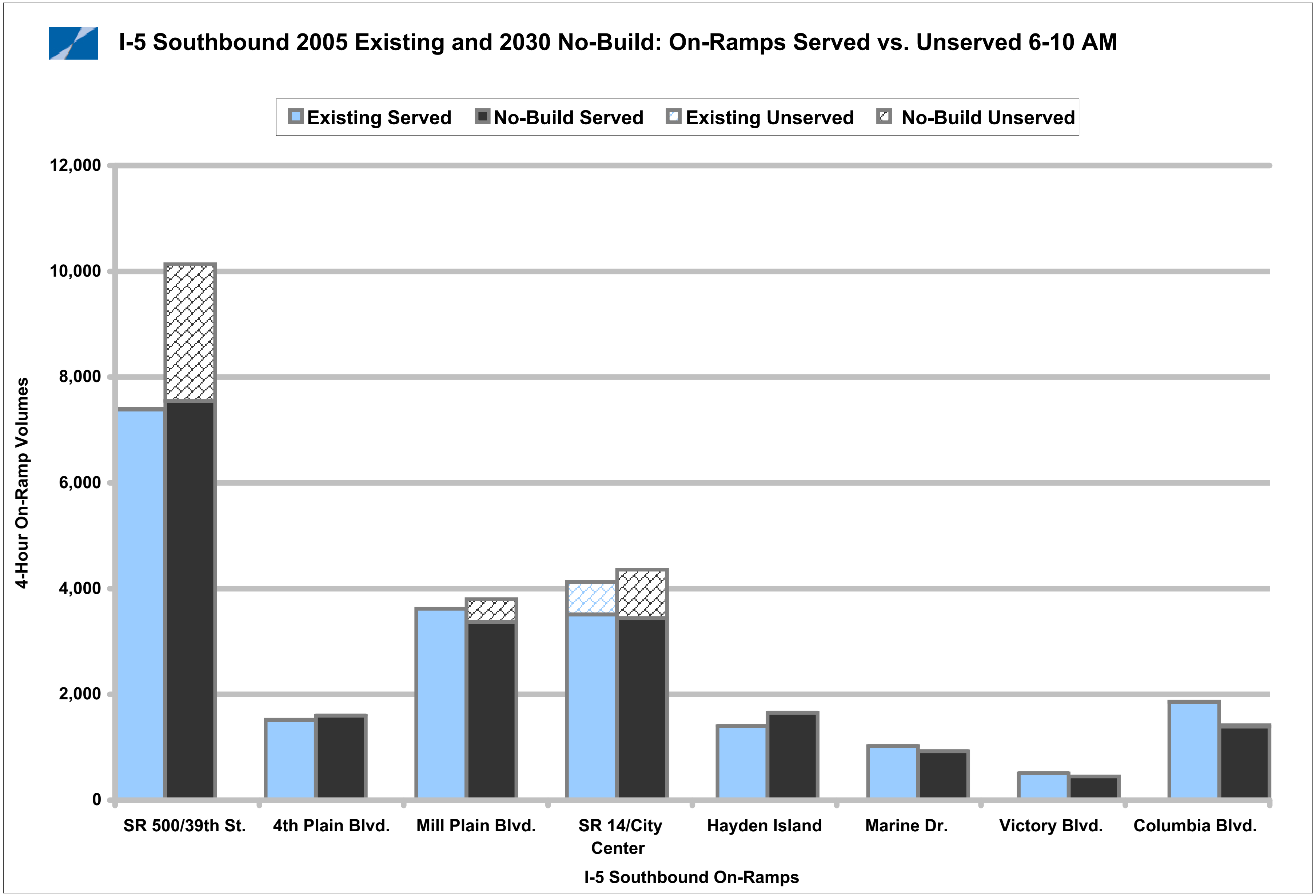


Exhibit 6-20



I-5 Southbound 2005 Existing and 2030 No-Build: On-Ramps Served vs. Unserved 6-10 AM
Existing Served
No-Build Served
Existing Unserved
No-Build Unserved
12,000
10,000
8,000
6,000
4,000
2,000
0
4-Hour On-Ramp Volumes
SR 500/39th St.
4th Plain Blvd.
Mill Plain Blvd.
SR 14/City Center
Hayden Island
Marine Dr.
Victory Blvd.
Columbia Blvd.
I-5 Southbound On-Ramps

Exhibit 6-21

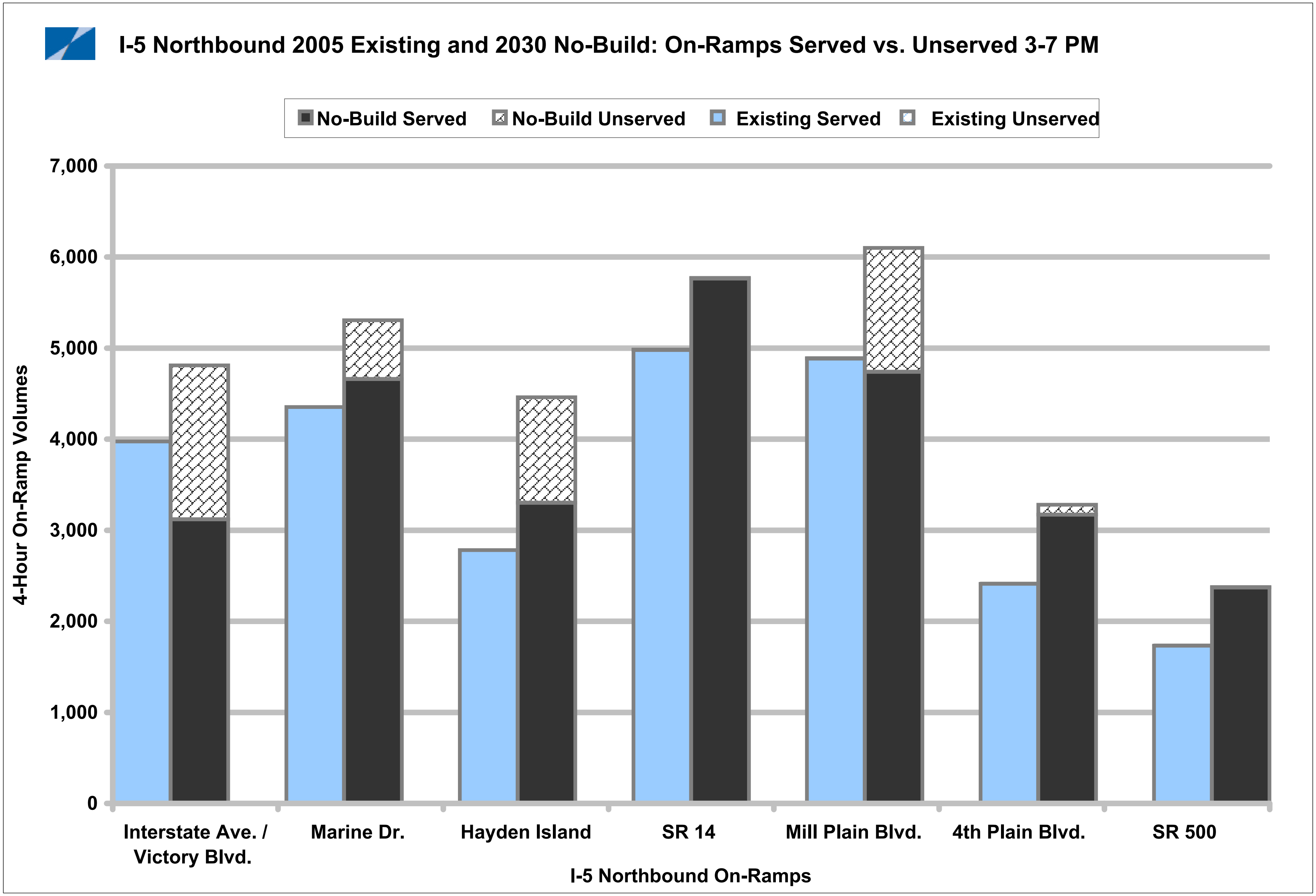
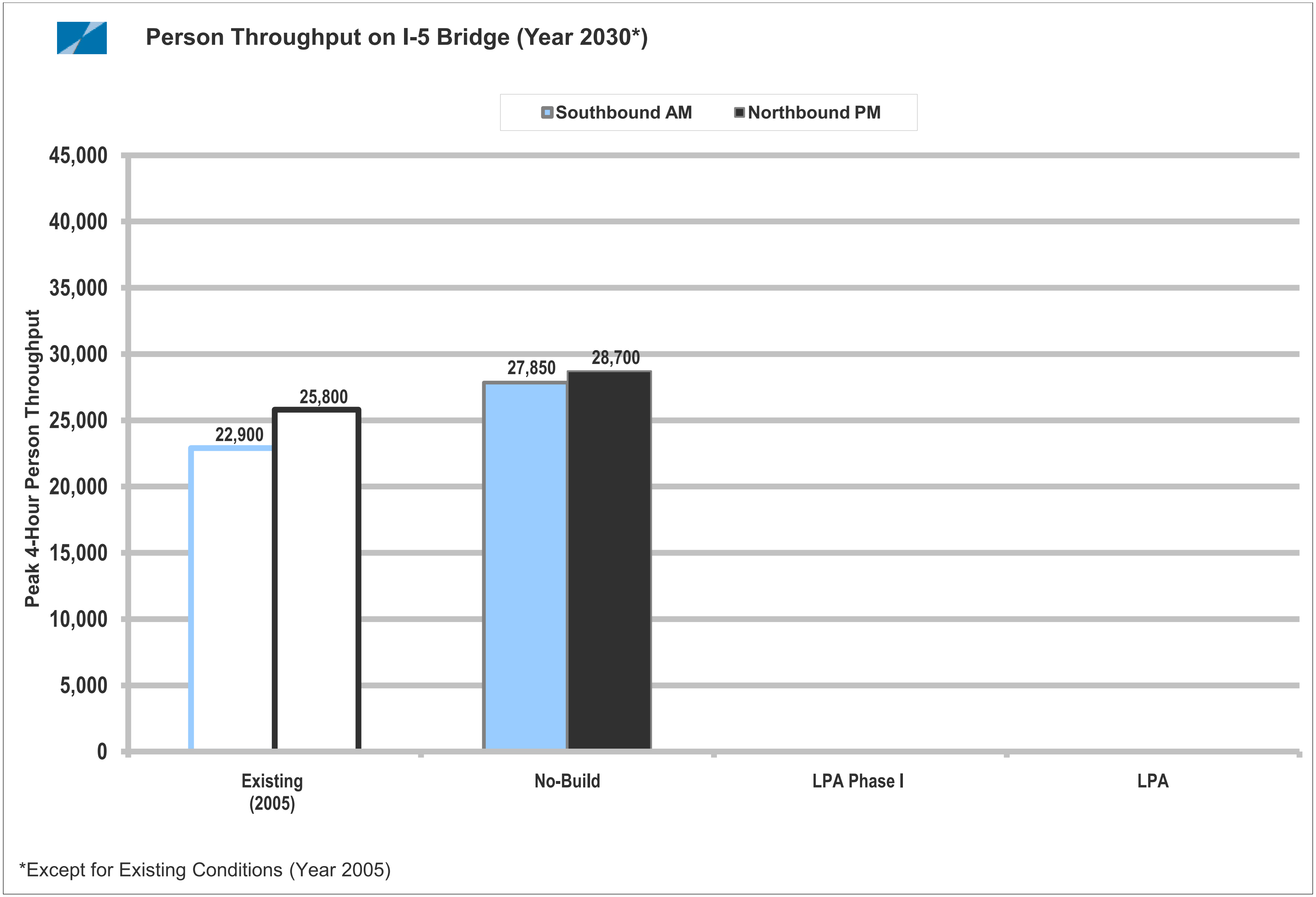

I-5 Northbound 2005 Existing and 2030 No-Build: On-Ramps Served vs. Unserved 3-7 PM
No-Build Served
No-Build Unserved
Existing Served
Existing Unserved
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
4-Hour On-Ramp Volumes
Interstate Ave. / Victory Blvd.
Marine Dr.
Hayden Island
SR 14
Mill Plain Blvd.
4th Plain Blvd.
SR 500
I-5 Northbound On-Ramps

Exhibit 6-22



Person Throughput on I-5 Bridge (Year 2030*)
Southbound AM
Northbound PM
Peak 4-Hour Person Throughput
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
22,900
25,800
27,850
28,700
Existing (2005)
No-Build
LPA Phase I
LPA
*Except for Existing Conditions (Year 2005)

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Exhibit 6-23

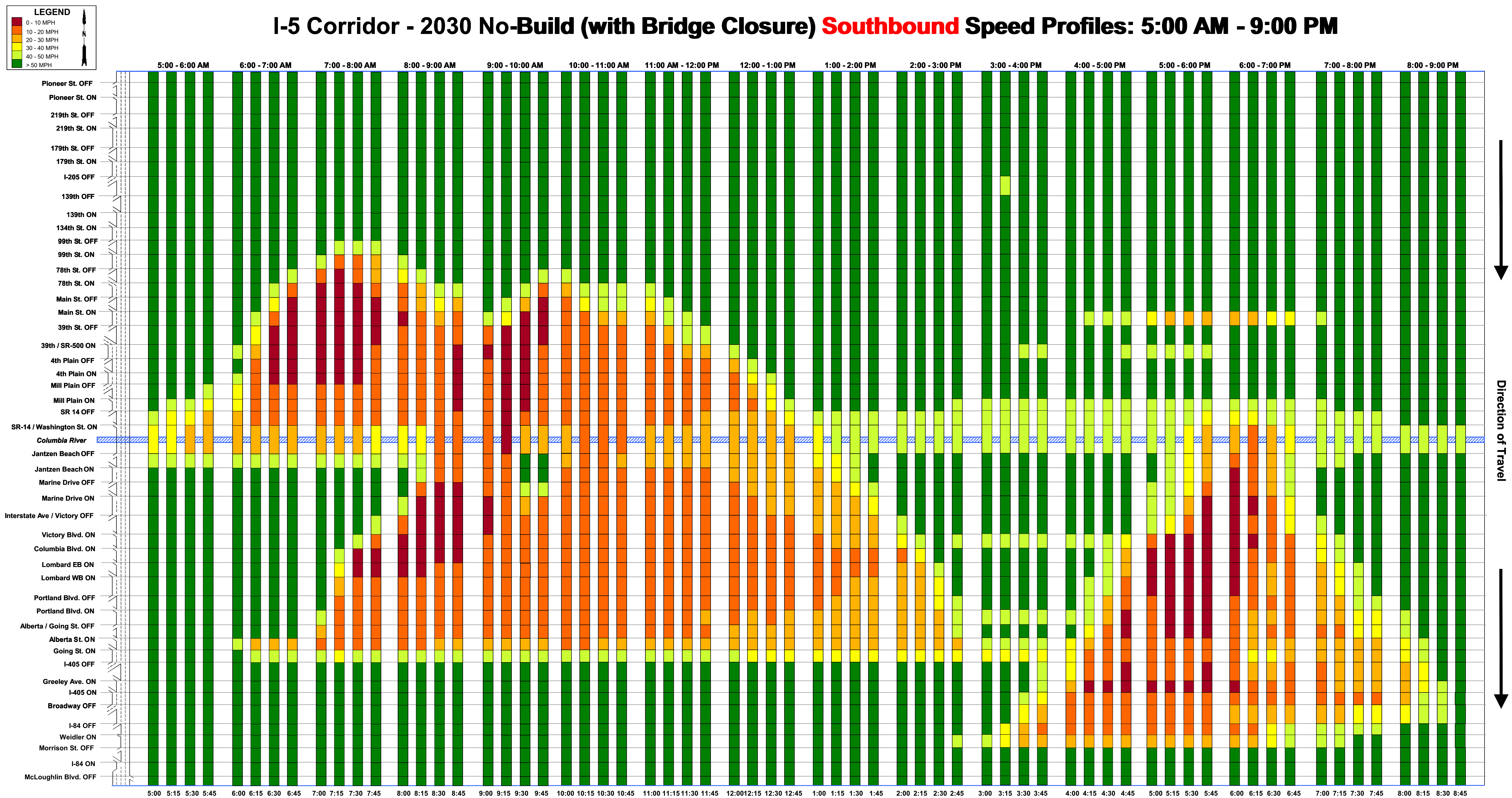

I-5 Corridor - 2030 No-Build (with Bridge Closure) Southbound Speed Profiles: 5:00 AM - 9:00 PM
LEGEND
0 - 10 MPH
10 - 20 MPH
20 - 30 MPH
30 - 40 MPH
40 - 50 MPH
> 50 MPH
5:00 - 6:00 AM
6:00 - 7:00 AM
7:00 - 8:00 AM
8:00 - 9:00 AM
9:00 - 10:00 AM
10:00 - 11:00 AM
11:00 AM - 12:00 PM
12:00 - 1:00 PM
1:00 - 2:00 PM
2:00 - 3:00 PM
3:00 - 4:00 PM
4:00 - 5:00 PM
5:00 - 6:00 PM
6:00 - 7:00 PM
7:00 - 8:00 PM
8:00 - 9:00 PM
Pioneer St. OFF
Pioneer St. ON
219th St. OFF
219th St. ON
179th St. OFF
179th St. ON
I-205 OFF
139th OFF
139th ON
134th St. ON
99th St. OFF
99th St. ON
78th St. OFF
78th St. ON
Main St. OFF
Main St. ON
39th St. OFF
39th / SR-500 ON
4th Plain OFF
4th Plain ON
Mill Plain OFF
Mill Plain ON
SR 14 OFF
SR-14 / Washington St. ON
Columbia River
Jantzen Beach OFF
Jantzen Beach ON
Marine Drive OFF
Marine Drive ON
Interstate Ave / Victory OFF
Victory Blvd. ON
Columbia Blvd. ON
Lombard EB ON
Lombard WB ON
Portland Blvd. OFF
Portland Blvd. ON
Alberta / Going St. OFF
Alberta St. ON
Going St. ON
I-405 OFF
Greeley Ave. ON
I-405 ON
Broadway OFF
I-84 OFF
Weidler ON
Morrison St. OFF
I-84 ON
McLoughlin Blvd. OFF
Direction of Travel
5:00 5:15 5:30 5:45 6:00 6:15 6:30 6:45 7:00 7:15 7:30 7:45 8:00 8:15 8:30 8:45 9:00 9:15 9:30 9:45 10:00 10:15 10:30 10:45 11:00 11:15 11:30 11:45 12:00 12:15 12:30 12:45 1:00 1:15 1:30 1:45 2:00 2:15 2:30 2:45 3:00 3:15 3:30 3:45 4:00 4:15 4:30 4:45 5:00 5:15 5:30 5:45 6:00 6:15 6:30 6:45 7:00 7:15 7:30 7:45 8:00 8:15 8:30 8:45

Exhibit 6-24

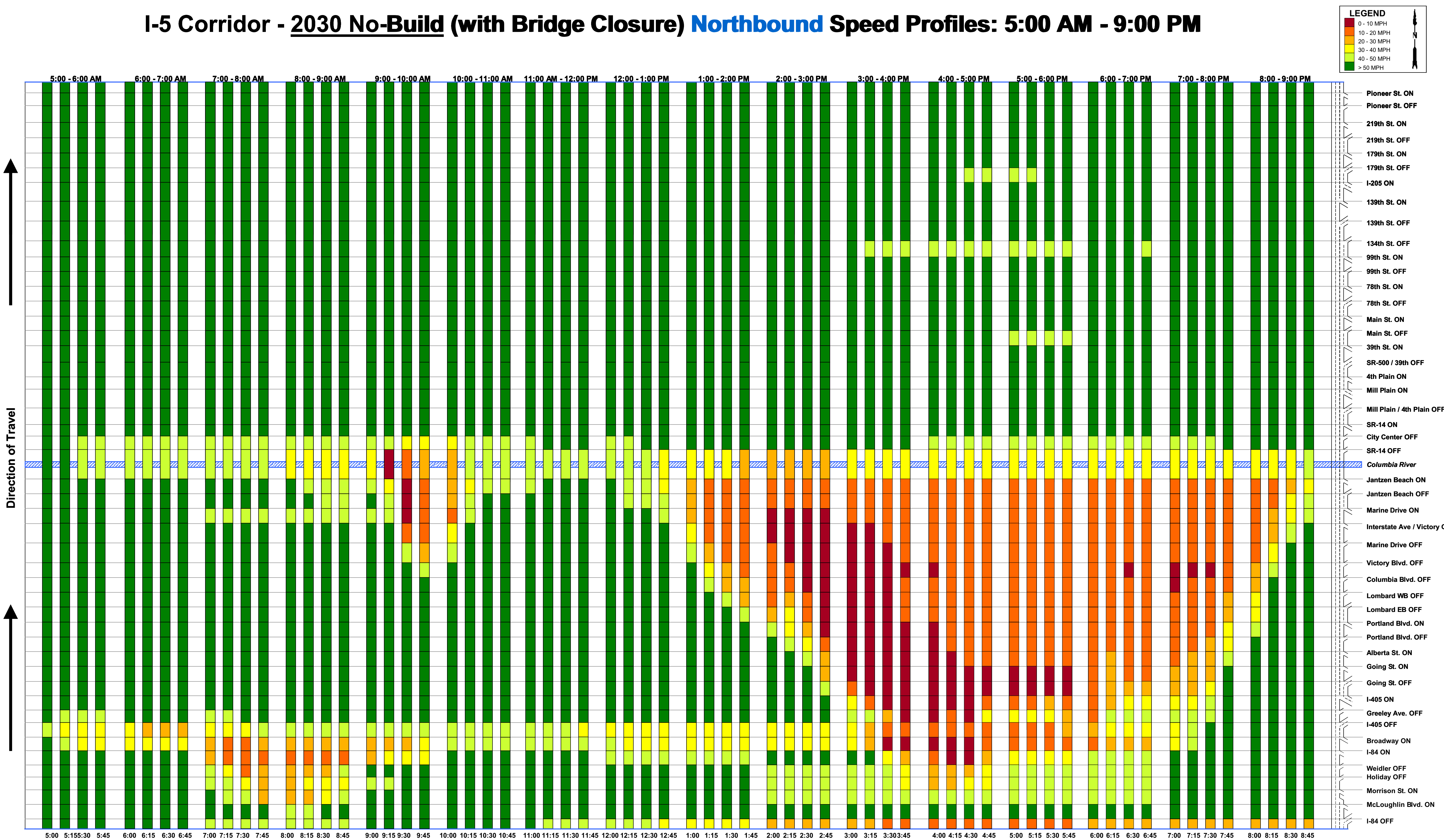
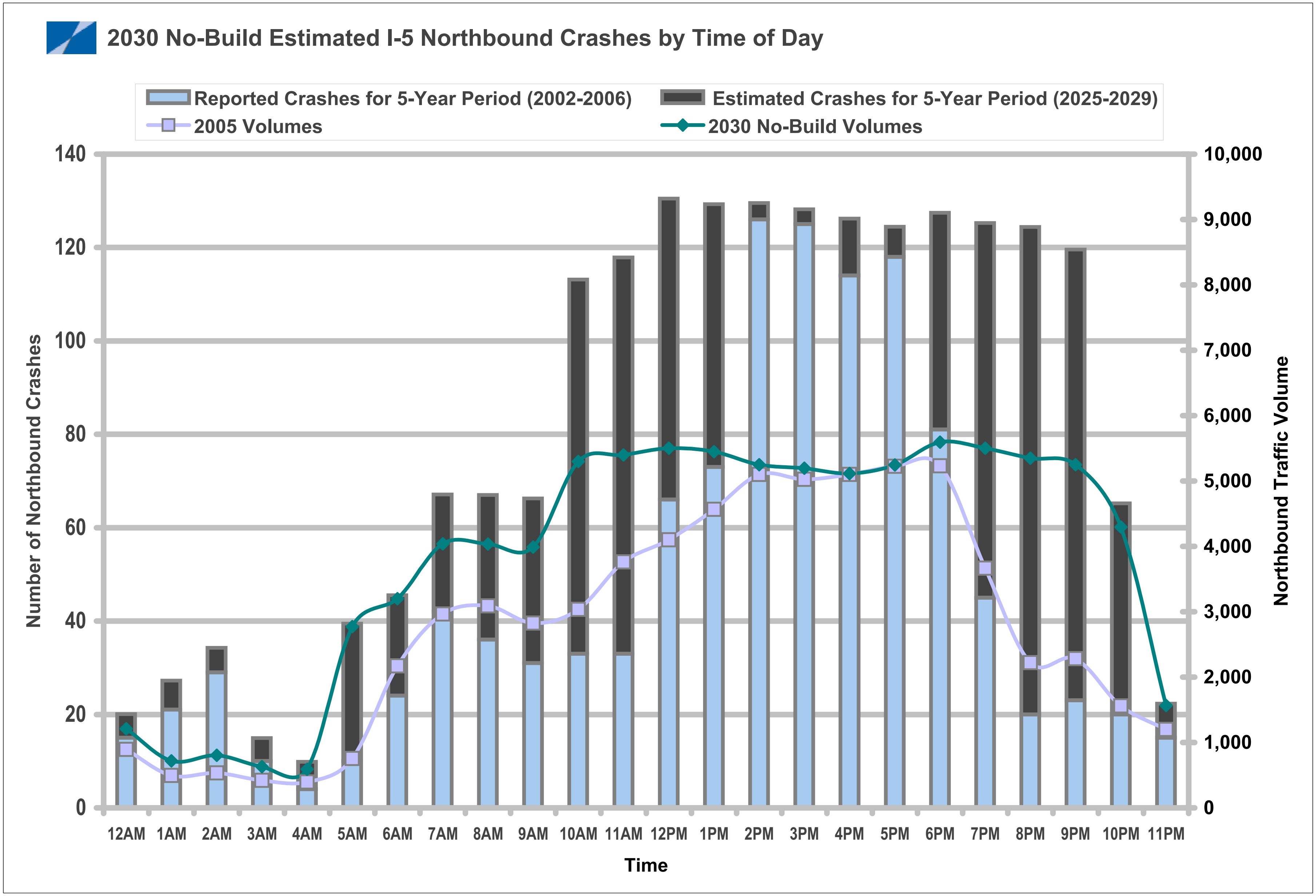

I-5 Corridor - 2030 No-Build (with Bridge Closure) Northbound Speed Profiles: 5:00 AM - 9:00 PM
LEGEND
0 - 10 MPH
10 - 20 MPH
20 - 30 MPH
30 - 40 MPH
40 - 50 MPH
> 50 MPH
N
Direction of Travel
5:00 - 6:00 AM
6:00 - 7:00 AM
7:00 - 8:00 AM
8:00 - 9:00 AM
9:00 - 10:00 AM
10:00 - 11:00 AM
11:00 AM - 12:00 PM
12:00 - 1:00 PM
1:00 - 2:00 PM
2:00 - 3:00 PM
3:00 - 4:00 PM
4:00 - 5:00 PM
5:00 - 6:00 PM
6:00 - 7:00 PM
7:00 - 8:00 PM
8:00 - 9:00 PM
Pioneer St. ON
Pioneer St. OFF
219th St. ON
219th St. OFF
179th St. ON
179th St. OFF
I-205 ON
139th St. ON
139th St. OFF
134th St. OFF
99th St. ON
99th St. OFF
78th St. ON
78th St. OFF
Main St. ON
Main St. OFF
39th St. ON
SR-500 / 39th OFF
4th Plain ON
Mill Plain ON
Mill Plain / 4th Plain OFF
SR-14 ON
City Center OFF
SR-14 OFF
Columbia River
Jantzen Beach ON
Jantzen Beach OFF
Marine Drive ON
Interstate Ave / Victory ON
Marine Drive OFF
Victory Blvd. OFF
Columbia Blvd. OFF
Lombard WB OFF
Lombard EB OFF
Portland Blvd. ON
Portland Blvd. OFF
Alberta St. ON
Going St. ON
Going St. OFF
I-405 ON
Greeley Ave. OFF
I-405 OFF
Broadway ON
I-84 ON
Weidler OFF
Holiday OFF
Morrison St. ON
McLoughlin Blvd. ON
I-84 OFF
5:00 5:15 5:30 5:45
6:00 6:15 6:30 6:45
7:00 7:15 7:30 7:45
8:00 8:15 8:30 8:45
9:00 9:15 9:30 9:45
10:00 10:15 10:30 10:45
11:00 11:15 11:30 11:45
12:00 12:15 12:30 12:45
1:00 1:15 1:30 1:45
2:00 2:15 2:30 2:45
3:00 3:15 3:30 3:45
4:00 4:15 4:30 4:45
5:00 5:15 5:30 5:45
6:00 6:15 6:30 6:45
7:00 7:15 7:30 7:45
8:00 8:15 8:30 8:45

Exhibit 6-25



2030 No-Build Estimated I-5 Northbound Crashes by Time of Day
Reported Crashes for 5-Year Period (2002-2006)
Estimated Crashes for 5-Year Period (2025-2029)
2005 Volumes
2030 No-Build Volumes
Number of Northbound Crashes
Northbound Traffic Volume
Time
0
20
40
60
80
100
120
140
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
9,000
10,000
12AM
1AM
2AM
3AM
4AM
5AM
6AM
7AM
8AM
9AM
10AM
11AM
12PM
1PM
2PM
3PM
4PM
5PM
6PM
7PM
8PM
9PM
10PM
11PM

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Exhibit 6-26

Vancouver North-South Screenlines - AM Peak Hour Volumes			
Screenline	**2005 Existing**	**2030 No Build**	**Difference**
West of Franklin St			
Westbound Total	1,350	2,850	111%
Eastbound Total	1,400	2,000	43%
West of I-5			
Westbound Total	3,100	4,450	44%
Eastbound Total	2,750	3,350	22%
East of I-5			
Westbound Total	2,550	3,450	35%
Eastbound Total	2,300	3,000	30%

Vancouver East-West Screenlines - AM Peak Hour Volumes			
Screenline	**2005 Existing**	**2030 No Build**	**Difference**
North of Evergreen Blvd			
Southbound Total	950	1,450	53%
Northbound Total	800	1,050	31%
North of 15th St			
Southbound Total	1,300	2,100	62%
Northbound Total	450	500	11%
North of 4th Plain Blvd			
Southbound Total	1,500	2,200	47%
Northbound Total	350	350	0%
North of 39th St			
Southbound Total	800	1,250	56%
Northbound Total	250	250	0%

Exhibit 6-27

Vancouver North-South Screenlines - PM Peak Hour Volumes			
Screenline	2005 Existing	2030 No Build	Difference
West of Franklin St			
Westbound Total	1,550	2,500	61%
Eastbound Total	1,750	3,500	100%
West of I-5			
Westbound Total	2,900	3,950	36%
Eastbound Total	4,200	5,950	42%
East of I-5			
Westbound Total	2,550	3,050	20%
Eastbound Total	4,050	5,800	43%

Vancouver East-West Screenlines - PM Peak Hour Volumes			
Screenline	2005 Existing	2030 No Build	Difference
North of Evergreen Blvd			
Southbound Total	950	1,050	11%
Northbound Total	1,200	1,850	54%
North of 15th St			
Southbound Total	850	1,000	18%
Northbound Total	950	1,350	42%
North of 4th Plain Blvd			
Southbound Total	600	650	8%
Northbound Total	950	1,300	37%
North of 39th St			
Southbound Total	500	550	10%
Northbound Total	650	950	46%

Exhibit 6-28

Portland North-South Screenlines - AM Peak Hour Volumes			
Screenline	**2005 Existing**	**2030 No Build**	**Difference**
West of Interstate			
Westbound Total	3,050	4,250	39%
Eastbound Total	2,500	3,200	28%
East of I-5			
Westbound Total	2,700	3,450	28%
Eastbound Total	2,100	2,950	40%
East of MLK Jr Blvd			
Westbound Total	3,350	3,950	18%
Eastbound Total	2,250	2,850	27%

Portland East-West Screenlines - AM Peak Hour Volumes			
Screenline	**2005 Existing**	**2030 No Build**	**Difference**
Columbia Slough			
Southbound Total	1,200	1,400	17%
Northbound Total	950	1,150	21%
North of Rosa Parks			
Southbound Total	1,100	1,150	5%
Northbound Total	600	750	25%
South of Alberta St			
Southbound Total	1,600	1,800	13%
Northbound Total	700	1,250	79%

Exhibit 6-29

Portland North-South Screenlines - PM Peak Hour Volumes			
Screenline	**2005 Existing**	**2030 No Build**	**Difference**
West of Interstate			
Westbound Total	2,350	3,100	32%
Eastbound Total	3,450	4,950	43%
East of I-5			
Westbound Total	2,600	3,300	27%
Eastbound Total	2,950	3,850	31%
East of MLK Jr Blvd			
Westbound Total	2,650	3,300	25%
Eastbound Total	3,350	4,050	21%

Portland East-West Screenlines - PM Peak Hour Volumes			
Screenline	**2005 Existing**	**2030 No Build**	**Difference**
Columbia Slough			
Southbound Total	1,200	1,450	21%
Northbound Total	1,350	1,550	15%
North of Rosa Parks			
Southbound Total	1,100	1,550	41%
Northbound Total	1,600	1,850	16%
South of Alberta St			
Southbound Total	1,250	1,750	40%
Northbound Total	2,100	2,550	21%

Exhibit 6-30

No-Build
SR 14 Interchange Sub-area

Columbia River CROSSING

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Exhibit 6-31

Vancouver Intersection Performance Results

AM Peak Hour		2005 Existing Conditions								2030 No-Build							
#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)
A	Esther St. @ Columbia Way									Eastbound Left	5.6	A	0.01	LOS E	Y	-	-
B	Columbia St. @ Columbia Way[3]									Eastbound Left	4.5	A	0.05	LOS E	Y	-	-
01	3rd/4th St. @ Columbia St[3]	Westbound Left/Right	3.7	A	0.03	LOS E	Y	-	-	Eastbound Left/Right	4.8	A	0.04	LOS E	Y	-	-
C	3rd/4th St. @ Esther St.									Westbound Left/Right	3.6	A	0.09	LOS E	Y	-	-
02	4th St. @ Columbia St.	Eastbound Left/Thru/Right	4.4	A	0.03	LOS E	Y	-	-	Northbound Thru/Right	0.2	A	0.08	LOS E	Y	-	-
03	4th St. @ Washington St.	Eastbound Right	1.1	A	0.01	LOS E	Y	-	-	Eastbound Right	2.7	A	0.03	LOS E	Y	-	-
04	5th St. @ Columbia St.	Southbound Left	12.6	B	0.15	LOS E	Y	90	100 (SBL)	Southbound Left	3.0	A	0.12	LOS E	Y	-	-
05	5th St. @ Washington St.	***Overall Intersection***	39.6	D	0.42	LOS E	Y	180 215	200 (EBR to I-5) 225 (SBL)	***Overall Intersection***	9.5	A	0.44	LOS E	Y	-	-
06	6th St. @ Columbia St.	***Overall Intersection***	7.8	A	0.42	LOS E	Y	-	-	***Overall Intersection***	7.9	A	0.45	LOS E	Y	-	-
07	6th St. @ Washington St.	***Overall Intersection***	20.3	C	0.39	LOS E	Y	-	-	***Overall Intersection***	11.8	B	0.48	LOS E	Y	-	-
08	6th St. @ Main St.	***Overall Intersection***	6.5	A	0.38	LOS E	Y	-	-	***Overall Intersection***	7.6	A	0.53	LOS E	Y	-	-
09	6th St. @ Broadway	Southbound Right	1.8	A	0.02	LOS E	Y	-	-	Southbound Right	4.7	A	0.36	LOS E	Y	-	-
10	6th St. @ C St.	Northbound Left/Thru	5.7	A	-	LOS E	Y	-	-	Northbound Left/Thru	16.7	C	-	LOS E	Y	850	850 (NBLT)
11	8th St. @ Esther St.	Southbound Left/Thru/Right	6.0	A	0.08	LOS E	Y	-	-	Southbound Left/Thru/Right	8.8	A	0.19	LOS E	Y	-	-
12	8th St. @ Columbia St.	***Overall Intersection***	10.8	B	0.51	LOS E	Y	-	-	***Overall Intersection***	12.2	B	0.85	LOS E	Y	-	-
13	8th St. @ Washington St.	***Overall Intersection***	5.4	A	0.55	LOS E	Y	-	-	***Overall Intersection***	11.5	B	0.59	LOS E	Y	-	-
14	8th St. @ Main St.	***Overall Intersection***	11.3	B	0.55	LOS E	Y	-	-	***Overall Intersection***	12.2	B	0.58	LOS E	Y	-	-
15	8th St. @ Broadway	Southbound Left	6.6	A	0.22	LOS E	Y	-	-	Southbound Left/Thru/Right	10.3	B	0.65	LOS E	Y	-	-
16	8th St. @ C St.	***Overall Intersection***	10.0	A	0.48	LOS E	Y	-	-	***Overall Intersection***	16.2	B	0.58	LOS E	Y	-	-
17	9th St. @ Esther St.	Westbound Left/Thru/Right	5.6	A	0.08	LOS E	Y	-	-	Westbound Left/Thru/Right	4.2	A	6.00	LOS E	Y	-	-
18	9th St. @ Columbia St.	Eastbound Left/Thru/Right	5.4	A	0.05	LOS E	Y	-	-	Westbound Left/Thru/Right	7.0	A	0.13	LOS E	Y	-	-
19	9th St. @ Washington St.	Westbound Left	6.4	A	0.01	LOS E	Y	-	-	Westbound Left	5.4	A	0.04	LOS E	Y	-	-
20	9th St. @ Main St.	Northbound Left	6.2	A	0.05	LOS E	Y	50	75 (NBL)	Eastbound Left/Thru/Right	4.6	A	0.06	LOS E	Y	-	-
21	9th St. @ Broadway	Southbound Thru/Right	5.6	A	0.27	LOS E	Y	-	-	Eastbound Left/Right	3.9	A	0.04	LOS E	Y	-	-
22	Evergreen Blvd. @ Esther St.	Northbound Left/Thru/Right	4.7	A	0.12	LOS E	Y	-	-	Northbound Left/Thru/Right	7.6	A	0.12	LOS E	Y	-	-
23	Evergreen Blvd. @ Columbia St.	***Overall Intersection***	13.4	B	0.49	LOS E	Y	-	-	***Overall Intersection***	13.0	B	0.63	LOS E	Y	-	-
24	Evergreen Blvd. @ Washington St.	***Overall Intersection***	9.1	A	0.53	LOS E	Y	-	-	***Overall Intersection***	17.2	B	0.60	LOS E	Y	75	100 (WBL)
25	Evergreen Blvd. @ Main St.	***Overall Intersection***	7.9	A	0.53	LOS E	Y	-	-	***Overall Intersection***	14.8	B	0.68	LOS E	Y	-	-
26	Evergreen Blvd. @ Broadway	***Overall Intersection***	18.7	B	0.83	LOS E	Y	75 100 210	75 (WBL) 100 (SBL) 225 (SBTR)	***Overall Intersection***	14.9	B	0.70	LOS E	Y	75 210	125 (WBL) 225 (WBTR)
27	Evergreen Blvd. @ C St.	***Overall Intersection***	11.9	B	0.83	LOS E	Y	-	-	***Overall Intersection***	14.3	B	0.64	LOS E	Y	-	-
28	11th St. @ Esther St.	Southbound Left/Thru/Right	4.3	A	0.03	LOS E	Y	-	-	Southbound Left/Thru/Right	4.6	A	0.05	LOS E	Y	-	-
29	11th St. @ Columbia St.	Westbound Left/Thru/Right	6.9	A	0.14	LOS E	Y	-	-	Westbound Left/Thru/Right	8.1	A	0.29	LOS E	Y	-	-
30	11th St. @ Washington St.	Eastbound Thru/Right	6.0	A	0.07	LOS E	Y	-	-	Westbound Left/Thru	7.9	A	0.23	LOS E	Y	-	-
31	11th St. @ Main St.	Eastbound Thru/Right	4.7	A	0.08	LOS E	Y	-	-	Westbound Left/Thru/Right	6.3	A	0.16	LOS E	Y	-	-
32	11th St. @ Broadway	Eastbound Thru/Right	6.1	A	0.06	LOS E	Y	-	-	Westbound Left/Thru/Right	6.9	A	0.22	LOS E	Y	-	-
33	11th St. @ C St.	Eastbound Left/Thru	4.2	A	0.08	LOS E	Y	-	-	Eastbound Left/Thru	6.3	A	0.17	LOS E	Y	-	-
34	Mill Plain Blvd. @ Columbia St.	***Overall Intersection***	12.8	B	0.66	LOS E	Y	-	-	***Overall Intersection***	18.4	B	0.77	LOS E	Y	75 210	150 (SBL) 225 (SBT)
35	Mill Plain Blvd. @ Washington St.	***Overall Intersection***	7.2	A	0.40	LOS E	Y	-	-	***Overall Intersection***	7.0	A	0.43	LOS E	Y	-	-
36	Mill Plain Blvd. @ Main St.	***Overall Intersection***	4.7	A	0.57	LOS E	Y	-	-	***Overall Intersection***	11.5	B	1.01	LOS E	Y	70	150 (SBL)
37	Mill Plain Blvd. @ Broadway	***Overall Intersection***	12.2	B	0.51	LOS E	Y	190	200 (SBLT)	***Overall Intersection***	10.3	B	0.68	LOS E	Y	70	150 (SBL)
38	Mill Plain Blvd. @ C St.	***Overall Intersection***	8.3	A	0.34	LOS E	Y	-	-	***Overall Intersection***	8.0	A	0.38	LOS E	Y	-	-
39	Mill Plain Blvd. @ I-5 SB On-/Off-Ramps	***Overall Intersection***	18.6	B	0.58	LOS E	Y	350 275	375 (EBR) 350 (WBL)	***Overall Intersection***	20.4	C	0.75	LOS E	Y	800 350 275	800 (EBT) 500 (EBR) 350 (WBL)
40	Mill Plain Blvd. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	21.8	C	0.54	LOS E	Y	75	100 (WBR)	***Overall Intersection***	36.0	D	0.88	LOS E	Y	590 325	600 (NBLT) 500 (NBR)
41	15th St. @ Columbia St.	***Overall Intersection***	10.1	B	0.53	LOS E	Y	-	-	***Overall Intersection***	17.4	B	0.77	LOS E	Y	220	225 (WBLT)
42	15th St. @ Washington St.	***Overall Intersection***	4.9	A	0.44	LOS E	Y	-	-	***Overall Intersection***	12.3	B	0.54	LOS E	Y	210 210	250 (WBL) 225 (WBT)
43	15th St. @ Main St.	***Overall Intersection***	7.5	A	0.48	LOS E	Y	-	-	***Overall Intersection***	14.7	B	1.01	LOS E	Y	195	200 (WBLT)
44	15th St. @ Broadway	***Overall Intersection***	18.2	B	0.47	LOS E	Y	-	-	***Overall Intersection***	14.2	B	0.68	LOS E	Y	205	225 (WBLT)
45	15th St. @ C St.	***Overall Intersection***	8.8	A	0.48	LOS E	Y	-	-	***Overall Intersection***	8.3	A	0.58	LOS E	Y	-	-
D	16th St. @ Washington St.									Westbound Left/Thru	6.1	A	0.18	LOS E	Y	-	-
E	16th St. @ Main St.									Eastbound Left/Thru/Right	9.6	A	0.17	LOS E	Y	-	-
F	17th Street & Washington									Westbound Left/Thru	6.6	A	0.14	LOS E	Y	-	-
G	17th Street & Main									Eastbound Thru/Right	10.5	B	0.14	LOS E	Y	-	-
H	17th Street & Broadway									Westbound Left/Thru/Right	9.5	A	0.11	LOS E	Y	-	-
I	17th Street & C Street									Eastbound Left/Thru	5.7	A	0.09	LOS E	Y	-	-
J	17th Street & G Street									Eastbound Left/Thru/Right	2.7	A	0.04	LOS E	Y	-	-
46	McLoughlin Blvd. @ Columbia St.	***Overall Intersection***	7.3	A	0.52	LOS E	Y	-	-	***Overall Intersection***	12.2	B	0.64	LOS E	Y	-	-
K	McLoughlin Blvd. @ Washington St.									***Overall Intersection***	5.5	A	0.39	LOS E	Y	-	-
47	McLoughlin Blvd. @ Main St.	***Overall Intersection***	11.0	B	0.55	LOS E	Y	-	-	***Overall Intersection***	16.1	B	0.70	LOS E	Y	-	-
48	McLoughlin Blvd. @ Broadway	***Overall Intersection***	10.1	B	0.46	LOS E	Y	-	-	***Overall Intersection***	18.0	B	0.59	LOS E	Y	75	100 (WBL)
L	McLoughlin Blvd. @ C St.									***Overall Intersection***	5.9	A	0.30	LOS E	Y	-	-
M	McLoughlin Blvd. @ G St.									Northbound Left/Thru/Right	6.2	A	-	LOS E	Y	-	-
49	McLoughlin Blvd. @ Fort Vancouver Way	***Overall Intersection***	9.1	A	0.36	LOS D	Y	-	-	***Overall Intersection***	11.7	B	0.42	LOS D	Y	-	-
50	24th St. @ Columbia St.	Westbound Left/Thru/Right	8.4	A	0.12	LOS E	Y	-	-	Eastbound Left/Thru/Right	9.0	A	0.04	LOS E	Y	-	-
51	24th St. @ Main St.	Eastbound Left/Right	6.6	A	0.06	LOS E	Y	-	-	Eastbound Left/Right	9.8	A	0.05	LOS E	Y	-	-
52	4th Plain Blvd. @ Columbia St.	***Overall Intersection***	18.8	B	0.61	LOS D	Y	-	-	***Overall Intersection***	20.4	C	0.74	LOS D	Y	235	250 (SBTR)
53	4th Plain Blvd. @ Main St.	***Overall Intersection***	35.7	D	0.66	LOS D	Y	125 200 75 470	150 (WBL) 200 (WBTR) 100 (SBL) 475 (SBTR)	***Overall Intersection***	36.1	D	0.76	LOS D	Y	170 195 75 470	200 (WBL) 200 (WBT) 125 (SBL) 475 (SBTR)
54	4th Plain Blvd. @ Broadway	***Overall Intersection***	18.4	B	0.65	LOS D	Y	-	-	***Overall Intersection***	> 100	F	0.67	LOS D	N	195 495	200 (EBLT) 500 (WBT)
55	4th Plain Blvd. @ F St.	***Overall Intersection***	12.5	B	0.50	LOS D	Y	150	200 (EBL)	***Overall Intersection***	11.2	B	0.53	LOS D	Y	150	150 (EBT)
56	4th Plain Blvd. @ I-5 SB On-/Off-Ramps	***Overall Intersection***	8.8	A	0.46	LOS D	Y	-	-	***Overall Intersection***	17.5	B	0.64	LOS D	Y	200	275 (EBL)
57	4th Plain Blvd. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	12.3	B	0.51	LOS D	Y	75	150 (WBR)	***Overall Intersection***	16.2	B	0.58	LOS D	Y	75	125 (WBR)
58	4th Plain Blvd. @ Post Cemetery	Eastbound Left	6.5	A	0.01	LOS E	Y	-	-	Eastbound Left	7.4	A	0.00	LOS E	Y	-	-
59	4th Plain Blvd. @ St. Johns Blvd.	***Overall Intersection***	13.2	B	0.41	LOS D	Y	-	-	***Overall Intersection***	16.8	B	0.42	LOS D	Y	-	-
60	28th St. @ Main St.	Eastbound Left/Thru/Right	> 100	F	0.07	LOS E	N	215	225 (SBTR)	Eastbound Left/Thru/Right	> 100	F	0.10	LOS E	N	215	225 (SBTR)
61	28th St. @ Broadway	Northbound Thru/Right	1.0	A	-	LOS E	Y	-	-	Westbound Left	5.4	A	0.24	LOS E	Y	-	-
62	29th St. @ Main St./Broadway	Eastbound Left/Thru/Right	23.8	C	-	LOS E	Y	-	-	Westbound Left/Thru/Right	74.8	F	-	LOS E	N	1000	1000 (SBTR)
63	33rd St. @ Main St.	***Overall Intersection***	18.3	B	0.54	LOS D	Y	50 75	75 (WBL) 100 (SBL)	***Overall Intersection***	34.8	C	0.70	LOS D	Y	50 50 75	50 (EBL) 75 (WBL) 100 (NBL)
64	39th St. @ Main St.	***Overall Intersection***	28.5	C	0.69	LOS D	Y	75 75 215 125	125 (EBL) 125 (WBL) 225 (WBTR) 175 (SBL)	***Overall Intersection***	> 100	F	0.93	LOS D	N	75 1310 75 215 75 125 360	125 (EBL) 1325 (EBTR) 125 (WBL) 225 (WBTR) 125 (NBL) 200 (SBL) 375 (SBT)
65	39th St. @ F St.	Southbound Left/Thru/Right	22.6	C	0.12	LOS E	Y	50	75 (WBL)	Northbound Left/Thru/Right	> 100	F	0.12	LOS E	N	50 430	75 (WBL) 450 (WBTR)
66	39th St. @ H St.	***Overall Intersection***	8.2	A	0.54	LOS D	Y	135	150 (WBTR)	***Overall Intersection***	26.0	C	0.66	LOS D	Y	135	150 (WBTR)
67	39th St. @ I-5 SB On-/Off-Ramps	Northbound Left	68.0	F	1.55	LOS E	N	1660 125	600 (NBL) 200 (NBR)	***Overall Intersection***	64.4	E	0.60	LOS D	N	135 55 275 715 1660 125	150 (EBT) 100 (EBR) 375 (WBL) 725 (WBT) 1675 (NBL) 275 (NBR)
68	39th St. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	11.9	B	0.59	LOS D	Y	-	-	***Overall Intersection***	> 100	F	0.80	LOS D	N	300 715 1170 790 75	325 (EBL) 725 (EBT) 1175 (WBTR) 800 (NBLT) 75 (NBR)
69	WSDOT/40th St. @ Main St.	***Overall Intersection***	4.5	A	0.44	LOS D	Y	-	-	***Overall Intersection***	21.5	C	0.57	LOS D	Y	-	-
70	45th St. @ Main St.	***Overall Intersection***	7.4	A	0.44	LOS D	Y	-	-	***Overall Intersection***	9.4	A	0.64	LOS D	Y	-	-
71	Hazel Dell @ Main St. (West)	***Overall Intersection***	9.7	A	0.50	LOS D	Y	-	-	***Overall Intersection***	13.9	B	0.71	LOS D	Y	-	-
72	Ross St. @ Main St.	***Overall Intersection***	4.6	A	0.29	LOS D	Y	-	-	***Overall Intersection***	6.7	A	0.47	LOS D	Y	60	75 (WBL)
73	Ross St. @ North Rd.	Northbound Left/Thru	6.0	A	0.24	LOS E	Y	-	-	Northbound Left/Thru	7.2	A	0.39	LOS E	Y	-	-

(yellow)	Delay / LOS affected by freeway congestion
(blue)	Intersection queuing spills back into upstream intersection
Note 1	The ICU is used for overall intersections (signalized and unsignalized). The V/C is used for the identified movement(s) at unsignalized intersections.
Note 2	The 2003 Vancouver Concurrency Administration Manual designates an acceptable LOS standard of LOS E for downtown and LOS D for all other intersections.
Note 3	2030 LPA and LPA Phase I Roundabout intersection operations taken from VISSIM analysis
*	Intersection not modeled in existing conditions scenario
Y*	Intersection does not meet standard in the Build scenario, but meets the "do no worse" criteria as compared to the No Build.
Y**	Intersection operations are no worse than No Build, and no mitigation is required.

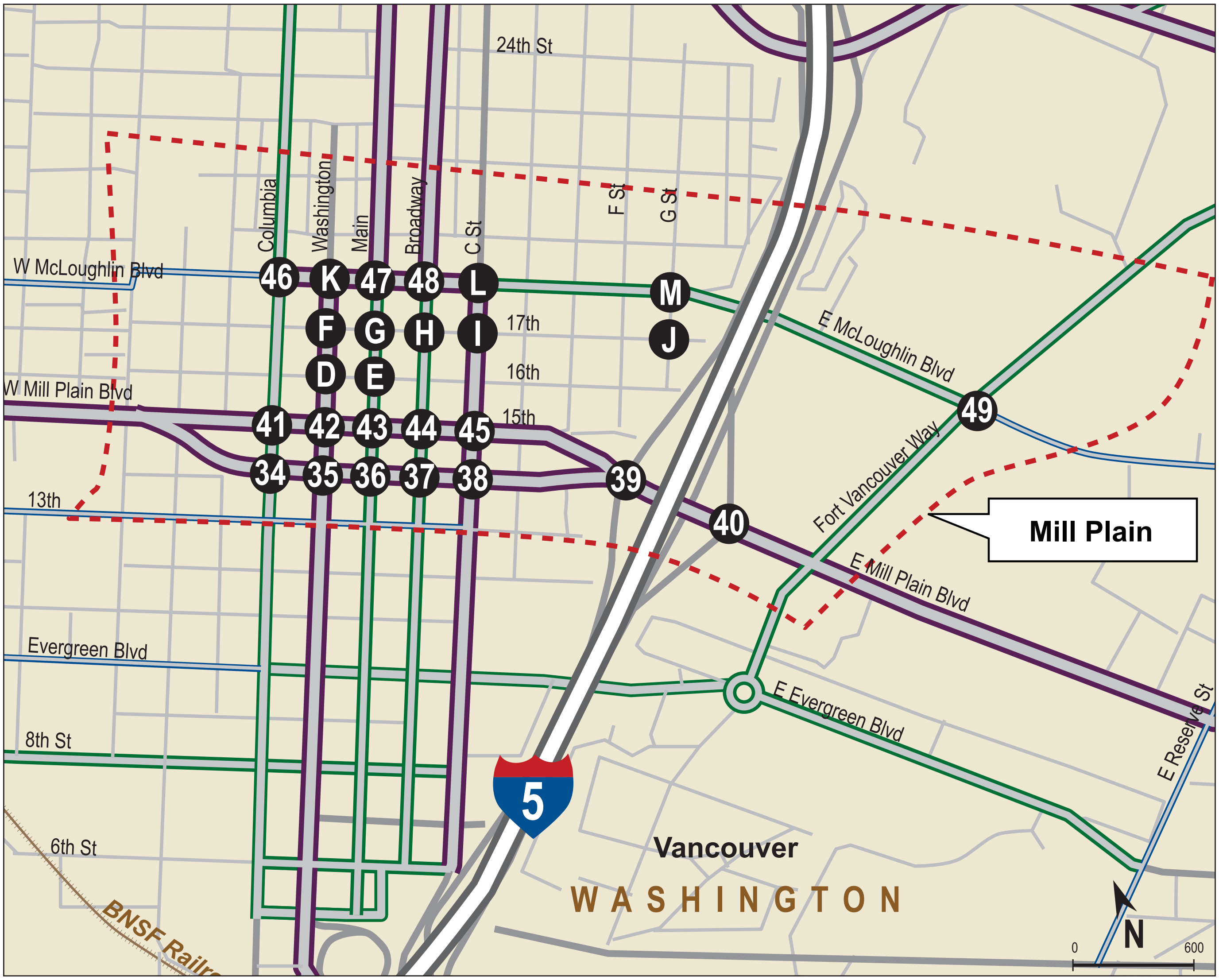
Exhibit 6-32

Vancouver Intersection Performance Results

PM Peak Hour		2005 Existing Conditions								2030 No-Build							
#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)
A	Esther St. @ Columbia Way									Eastbound Left	6.2	A	0.08	LOS E	Y	-	-
B	Columbia St. @ Columbia Way[3]									Eastbound Left	6.0	A	0.07	LOS E	Y	-	-
01	3rd/4th St. @ Columbia St[3]	Westbound Left/Right	4.7	A	0.05	LOS E	Y	-	-	Eastbound Left/Right	6.7	A	0.16	LOS E	Y	-	-
C	3rd/4th St. @ Esther St.									Westbound Left/Right	3.1	A	0.01	LOS E	Y	-	-
02	4th St. @ Columbia St.	Westbound Left/Thru/Right	4.8	A	0.05	LOS E	Y	-	-	Northbound Thru/Right	0.4	A	0.21	LOS E	Y	-	-
03	4th St. @ Washington St.	Eastbound Right	1.6	A	0.01	LOS E	Y	-	-	Eastbound Right	2.7	A	0.01	LOS E	Y	-	-
04	5th St. @ Columbia St.	Southbound Left	3.6	A	0.22	LOS E	Y	-	-	Southbound Left	9.1	A	0.41	LOS E	Y	90	125 (SBL)
05	5th St. @ Washington St.	***Overall Intersection***	8.1	A	0.34	LOS E	Y	-	-	***Overall Intersection***	13.4	B	0.54	LOS E	Y	180	200 (EBR to SR-14)
																210	225 (SBT)
06	6th St. @ Columbia St.	***Overall Intersection***	10.7	B	0.42	LOS E	Y	-	-	***Overall Intersection***	13.1	B	0.69	LOS E	Y	-	-
07	6th St. @ Washington St.	***Overall Intersection***	11.6	B	0.36	LOS E	Y	-	-	***Overall Intersection***	15.2	B	0.57	LOS E	Y	-	-
08	6th St. @ Main St.	***Overall Intersection***	5.3	A	0.43	LOS E	Y	-	-	***Overall Intersection***	6.5	A	0.60	LOS E	Y	-	-
09	6th St. @ Broadway	Southbound Right	4.6	A	0.22	LOS E	Y	-	-	Southbound Right	4.7	A	0.22	LOS E	Y	-	-
10	6th St. @ C St.	Northbound Left/Thru	2.1	A	-	LOS E	Y	-	-	Northbound Left/Thru	2.9	A	0.30	LOS E	Y	-	-
11	8th St. @ Esther St.	Northbound Left/Thru/Right	8.0	A	0.31	LOS E	Y	-	-	Northbound Left/Thru/Right	14.6	B	0.50	LOS E	Y	-	-
12	8th St. @ Columbia St.	***Overall Intersection***	15.1	B	0.74	LOS E	Y	-	-	***Overall Intersection***	21.6	C	1.10	LOS E	Y	215	225 (SBLTR)
13	8th St. @ Washington St.	***Overall Intersection***	9.5	A	0.58	LOS E	Y	75	125 (WBL)	***Overall Intersection***	10.2	B	0.56	LOS E	Y	-	-
14	8th St. @ Main St.	***Overall Intersection***	17.0	B	0.58	LOS E	Y	-	-	***Overall Intersection***	13.5	B	0.58	LOS E	Y	-	-
15	8th St. @ Broadway	Southbound Thru/Right	10.2	B	0.13	LOS E	Y	-	-	Southbound Left/Thru/Right	8.1	A	0.38	LOS E	Y	-	-
16	8th St. @ C St.	***Overall Intersection***	14.3	B	0.34	LOS E	Y	-	-	***Overall Intersection***	15.3	B	0.42	LOS E	Y	-	-
17	9th St. @ Esther St.	Westbound Left/Thru/Right	4.5	A	0.07	LOS E	Y	-	-	Eastbound Left/Thru/Right	3.7	A	0.02	LOS E	Y	-	-
18	9th St. @ Columbia St.	Westbound Left/Thru/Right	6.3	A	0.18	LOS E	Y	-	-	Eastbound Left/Thru/Right	13.8	B	0.14	LOS E	Y	-	-
19	9th St. @ Washington St.	Westbound Thru	8.5	A	0.08	LOS E	Y	-	-	Westbound Thru	7.2	A	0.08	LOS E	Y	-	-
20	9th St. @ Main St.	Northbound Thru	6.7	A	0.34	LOS E	Y	50	50 (NBL)	Eastbound Left/Thru/Right	6.0	A	0.06	LOS E	Y	-	-
21	9th St. @ Broadway	Southbound Thru/Right	6.2	A	0.24	LOS E	Y	-	-	Eastbound Left/Right	4.0	A	0.04	LOS E	Y	-	-
22	Evergreen Blvd. @ Esther St.	Southbound Left/Thru/Right	6.6	A	0.14	LOS E	Y	-	-	Southbound Left/Thru/Right	6.4	A	0.12	LOS E	Y	-	-
23	Evergreen Blvd. @ Columbia St.	***Overall Intersection***	10.9	B	0.53	LOS E	Y	-	-	***Overall Intersection***	18.4	B	0.59	LOS E	Y	225	225 (NBTR)
24	Evergreen Blvd. @ Washington St.	***Overall Intersection***	10.5	B	0.56	LOS E	Y	-	-	***Overall Intersection***	13.2	B	0.55	LOS E	Y	-	-
25	Evergreen Blvd. @ Main St.	***Overall Intersection***	9.7	A	0.56	LOS E	Y	-	-	***Overall Intersection***	13.1	B	0.55	LOS E	Y	-	-
26	Evergreen Blvd. @ Broadway	***Overall Intersection***	12.7	B	0.56	LOS E	Y	210	225 (SBTR)	***Overall Intersection***	10.0	A	0.54	LOS E	Y	-	-
27	Evergreen Blvd. @ C St.	***Overall Intersection***	13.0	B	0.56	LOS E	Y	-	-	***Overall Intersection***	16.8	B	0.63	LOS E	Y	75	100 (EBL)
28	11th St. @ Esther St.	Northbound Left/Thru/Right	6.3	A	0.11	LOS E	Y	-	-	Northbound Left/Thru/Right	5.8	A	0.11	LOS E	Y	-	-
29	11th St. @ Columbia St.	Eastbound Left/Thru/Right	8.9	A	0.34	LOS E	Y	-	-	Eastbound Left/Thru/Right	11.6	B	0.34	LOS E	Y	-	-
30	11th St. @ Washington St.	Eastbound Thru/Right	7.0	A	0.21	LOS E	Y	-	-	Eastbound Thru/Right	7.4	A	0.17	LOS E	Y	-	-
31	11th St. @ Main St.	Eastbound Thru/Right	7.5	A	0.41	LOS E	Y	-	-	Eastbound Left/Thru/Right	15.6	C	0.31	LOS E	Y	-	-
32	11th St. @ Broadway	Eastbound Thru/Right	6.2	A	0.19	LOS E	Y	-	-	Westbound Left/Thru/Right	6.7	A	0.30	LOS E	Y	-	-
33	11th St. @ C St.	Eastbound Left/Thru	7.8	A	0.18	LOS E	Y	-	-	Westbound Right	11.1	B	0.19	LOS E	Y	-	-
34	Mill Plain Blvd. @ Columbia St.	***Overall Intersection***	14.7	B	0.75	LOS E	Y	-	-	***Overall Intersection***	> 100	F	0.75	LOS E	N	810	825 (EBLTR)
																150	225 (NBR)
																75	100 (SBL)
35	Mill Plain Blvd. @ Washington St.	***Overall Intersection***	8.2	A	0.45	LOS E	Y	-	-	***Overall Intersection***	54.6	D	0.57	LOS E	Y	215	225 (EBTR)
36	Mill Plain Blvd. @ Main St.	***Overall Intersection***	12.4	B	0.62	LOS E	Y	100	150 (NBR)	***Overall Intersection***	78.5	E	0.79	LOS E	Y	210	225 (EBT)
																765	775 (NBTR)
																70	100 (SBL)
37	Mill Plain Blvd. @ Broadway	***Overall Intersection***	16.6	B	0.70	LOS E	Y	-	-	***Overall Intersection***	39.9	D	0.77	LOS E	Y	210	225 (EBT)
																70	100 (SBL)
38	Mill Plain Blvd. @ C St.	***Overall Intersection***	14.1	B	0.60	LOS E	Y	-	-	***Overall Intersection***	51.9	D	0.78	LOS E	Y	205	225 (EBT)
39	Mill Plain Blvd. @ I-5 SB On-/Off-Ramps	***Overall Intersection***	37.5	D	0.72	LOS E	Y	275	350 (WBL)	***Overall Intersection***	94.4	F	0.87	LOS E	N	795	800 (EBT)
																350	525 (EBR)
																275	400 (WBL)
																610	625 (WBT)
40	Mill Plain Blvd. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	26.8	C	0.86	LOS E	Y	610	725 (EBL)	***Overall Intersection***	36.5	D	0.97	LOS E	Y	450	450 (WBT)
								610	625 (EBT)							75	150 (WBR)
								75	125 (WBR)								
41	15th St. @ Columbia St.	***Overall Intersection***	9.0	A	0.54	LOS E	Y	-	-	***Overall Intersection***	8.3	A	0.75	LOS E	Y	-	-
42	15th St. @ Washington St.	***Overall Intersection***	5.6	A	0.37	LOS E	Y	-	-	***Overall Intersection***	10.1	B	0.43	LOS E	Y	-	-
43	15th St. @ Main St.	***Overall Intersection***	9.0	A	0.59	LOS E	Y	-	-	***Overall Intersection***	8.8	A	0.79	LOS E	Y	-	-
44	15th St. @ Broadway	***Overall Intersection***	24.8	C	0.43	LOS E	Y	210	250 (WBL)	***Overall Intersection***	8.3	A	0.77	LOS E	Y	70	100 (NBL)
																25	75 (SBR)
45	15th St. @ C St.	***Overall Intersection***	6.7	A	0.41	LOS E	Y	-	-	***Overall Intersection***	12.1	B	0.50	LOS E	Y	-	-
D	16th St. @ Washington St.									Westbound Left/Thru	6.1	A	0.19	LOS E	Y	-	-
E	16th St. @ Main St.									Eastbound Left/Thru/Right	8.1	A	0.24	LOS E	Y	-	-
F	17th Street & Washington									Westbound Left/Thru	5.6	A	0.06	LOS E	Y	-	-
G	17th Street & Main									Westbound Left/Thru/Right	8.6	A	0.15	LOS E	Y	-	-
H	17th Street & Broadway									Eastbound Left/Thru/Right	7.1	A	0.14	LOS E	Y	-	-
I	17th Street & C Street									Eastbound Left/Thru	6.1	A	0.14	LOS E	Y	-	-
J	17th Street & G Street									Southbound Left/Thru/Right	3.4	A	0.03	LOS E	Y	-	-
46	McLoughlin Blvd. @ Columbia St.	***Overall Intersection***	6.4	A	0.42	LOS E	Y	-	-	***Overall Intersection***	12.1	B	0.61	LOS E	Y	-	-
K	McLoughlin Blvd. @ Washington St.									***Overall Intersection***	5.9	A	0.50	LOS E	Y	-	-
47	McLoughlin Blvd. @ Main St.	***Overall Intersection***	11.6	B	0.67	LOS E	Y	-	-	***Overall Intersection***	15.7	B	0.76	LOS E	Y	-	-
48	McLoughlin Blvd. @ Broadway	***Overall Intersection***	7.8	A	0.39	LOS E	Y	-	-	***Overall Intersection***	12.0	B	0.50	LOS E	Y	-	-
L	McLoughlin Blvd. @ C St.									***Overall Intersection***	9.0	A	0.30	LOS E	Y	-	-
M	McLoughlin Blvd. @ G St.									Northbound Left/Thru/Right	5.8	A	-	LOS E	Y	-	-
49	McLoughlin Blvd. @ Fort Vancouver Way	***Overall Intersection***	12.6	B	0.43	LOS D	Y	-	-	***Overall Intersection***	12.5	B	0.42	LOS D	Y	-	-
50	24th St. @ Columbia St.	Eastbound Left/Thru/Right	5.4	A	-	LOS E	Y	-	-	Eastbound Left/Thru/Right	4.2	A	0.01	LOS E	Y	-	-
51	24th St. @ Main St.	Eastbound Left/Right	7.7	A	0.07	LOS E	Y	-	-	Eastbound Left/Right	46.2	E	0.07	LOS E	Y	-	-
52	4th Plain Blvd. @ Columbia St.	***Overall Intersection***	15.8	B	0.50	LOS D	Y	-	-	***Overall Intersection***	23.8	C	0.68	LOS D	Y	-	-
53	4th Plain Blvd. @ Main St.	***Overall Intersection***	28.3	C	0.66	LOS D	Y	125	150 (WBL)	***Overall Intersection***	39.5	D	0.78	LOS D	Y	250	300 (EBL)
								200	200 (WBTR)							495	500 (EBTR)
								75	100 (NBL)							170	200 (WBL)
								75	125 (NBR)							195	200 (WBT)
								75	125 (SBL)							75	100 (NBL)
																425	425 (NBT)
																75	125 (NBR)
																75	125 (SBL)
54	4th Plain Blvd. @ Broadway	***Overall Intersection***	24.0	C	0.94	LOS D	Y	125	150 (WBL)	***Overall Intersection***	22.4	C	0.98	LOS D	Y	195	200 (EBTR)
								495	500 (WBTR)							125	150 (WBL)
55	4th Plain Blvd. @ F St.	***Overall Intersection***	7.1	A	0.57	LOS D	Y	150	150 (EBT)	***Overall Intersection***	6.6	A	0.54	LOS D	Y	150	150 (EBT)
56	4th Plain Blvd. @ I-5 SB On-/Off-Ramps	***Overall Intersection***	11.3	B	0.54	LOS D	Y	-	-	***Overall Intersection***	19.8	B	0.82	LOS D	Y	200	275 (EBL)
																555	575 (EBT)
57	4th Plain Blvd. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	16.0	B	0.63	LOS D	Y	75	150 (WBR)	***Overall Intersection***	53.7	D	0.85	LOS D	Y	275	375 (EBL)
																850	850 (EBT)
																75	150 (WBR)
																600	625 (NBR)
58	4th Plain Blvd. @ Post Cemetery	Eastbound Left	7.0	A	-	LOS E	Y	-	-	Eastbound Left	9.1	A	0.01	LOS E	Y	-	-
59	4th Plain Blvd. @ St. Johns Blvd.	***Overall Intersection***	16.6	B	0.54	LOS D	Y	-	-	***Overall Intersection***	30.6	C	0.65	LOS D	Y	170	250 (EBL)
60	28th St. @ Main St.	Eastbound Left/Thru/Right	6.8	A	0.03	LOS E	Y	-	-	Eastbound Left/Thru/Right	6.3	A	0.03	LOS E	Y	-	-
61	28th St. @ Broadway	Northbound Thru/Right	1.9	A	-	LOS E	Y	-	-	Northbound Thru/Right	2.3	A	0.30	LOS E	Y	-	-
62	29th St. @ Main St./Broadway	Eastbound Left/Thru/Right	12.5	B	-	LOS E	Y	-	-	Westbound Left/Thru/Right	62.4	F	-	LOS E	N	-	-
63	33rd St. @ Main St.	***Overall Intersection***	18.3	B	0.45	LOS D	Y	50	75 (EBL)	***Overall Intersection***	48.6	D	0.56	LOS D	Y	50	100 (EBL)
								50	75 (WBL)							50	100 (WBL)
64	39th St. @ Main St.	***Overall Intersection***	38.3	D	0.71	LOS D	Y	75	125 (EBL)	***Overall Intersection***	> 100	F	0.96	LOS D	N	75	125 (EBL)
								490	500 (EBTR)							1270	1275 (EBTR)
								75	100 (WBL)							75	125 (WBL)
								215	225 (WBTR)							215	225 (WBTR)
								75	125 (NBL)							75	125 (NBL)
								125	175 (SBL)							1570	1575 (NBTR)
																125	175 (SBL)
																360	375 (SBT)
65	39th St. @ F St.	Northbound Left/Thru/Right	> 100	F	0.16	LOS E	N	-	-	Northbound Left/Thru/Right	> 100	F	0.33	LOS E	N	215	225 (EBTR)
								50	75 (WBL)							50	75 (WBL)
								430	450 (WBTR)							430	450 (WBTR)
																305	325 (NBLR)
66	39th St. @ H St.	***Overall Intersection***	8.3	A	0.57	LOS D	Y	135	150 (WBTR)	***Overall Intersection***	64.3	E	0.76	LOS D	N	430	450 (EBTR)
																135	150 (WBTR)
																310	325 (SBLTR)
67	39th St. @ I-5 SB On-/Off-Ramps	Northbound Left	30.0	D	-	LOS E	Y	-	-	***Overall Intersection***	43.7	D	0.76	LOS D	Y	135	150 (EBT)
								55	100 (EBR)							55	100 (EBR)
								125	175 (NBR)							710	725 (WBT)
																1660	1150 (NBR)
68	39th St. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	23.1	C	0.76	LOS D	Y	75	125 (NBR)	***Overall Intersection***	> 100	F	0.91	LOS D	N	300	325 (EBL)
																710	725 (EBT)
																790	800 (NBLT)
																75	100 (NBR)
69	WSDOT/40th St. @ Main St.	***Overall Intersection***	4.9	A	0.33	LOS D	Y	-	-	***Overall Intersection***	45.3	D	0.53	LOS D	Y	360	375 (NBTR)
70	45th St. @ Main St.	***Overall Intersection***	9.1	A	0.44	LOS D	Y	-	-	***Overall Intersection***	16.5	B	0.51	LOS D	Y	335	350 (NBL)
																25	50 (NBR)
71	Hazel Dell @ Main St. (West)	***Overall Intersection***	8.5	A	0.45	LOS D	Y	-	-	***Overall Intersection***	20.5	C	0.58	LOS D	Y	-	-
72	Ross St. @ Main St.	***Overall Intersection***	8.5	A	0.46	LOS D	Y	60	75 (WBL)	***Overall Intersection***	13.0	B	0.63	LOS D	Y	60	75 (WBL)
								60	75 (WBR)							60	75 (WBR)
73	Ross St. @ North Rd.	Southbound Thru/Right	5.0	A	0.18	LOS E	Y	-	-	Southbound Thru/Right	23.0	C	0.32	LOS E	Y	-	-

	Delay / LOS affected by freeway congestion
	Intersection queuing spills back into upstream intersection
Note 1	The ICU is used for overall intersections (signalized and unsignalized). The V/C is used for the identified movement(s) at unsignalized intersections.
Note 2	The 2003 Vancouver Concurrency Administration Manual designates an acceptable LOS standard of LOS E for downtown and LOS D for all other intersections.
Note 3	2030 LPA and LPA Phase I Roundabout intersection operations taken from VISSIM analysis
*	Intersection not modeled in existing conditions scenario
Y*	Intersection does not meet standard in the Build scenario, but meets the "do no worse" criteria as compared to the No Build.
Y**	Intersection operations are no worse than No Build, and no mitigation is required.

Exhibit 6-33

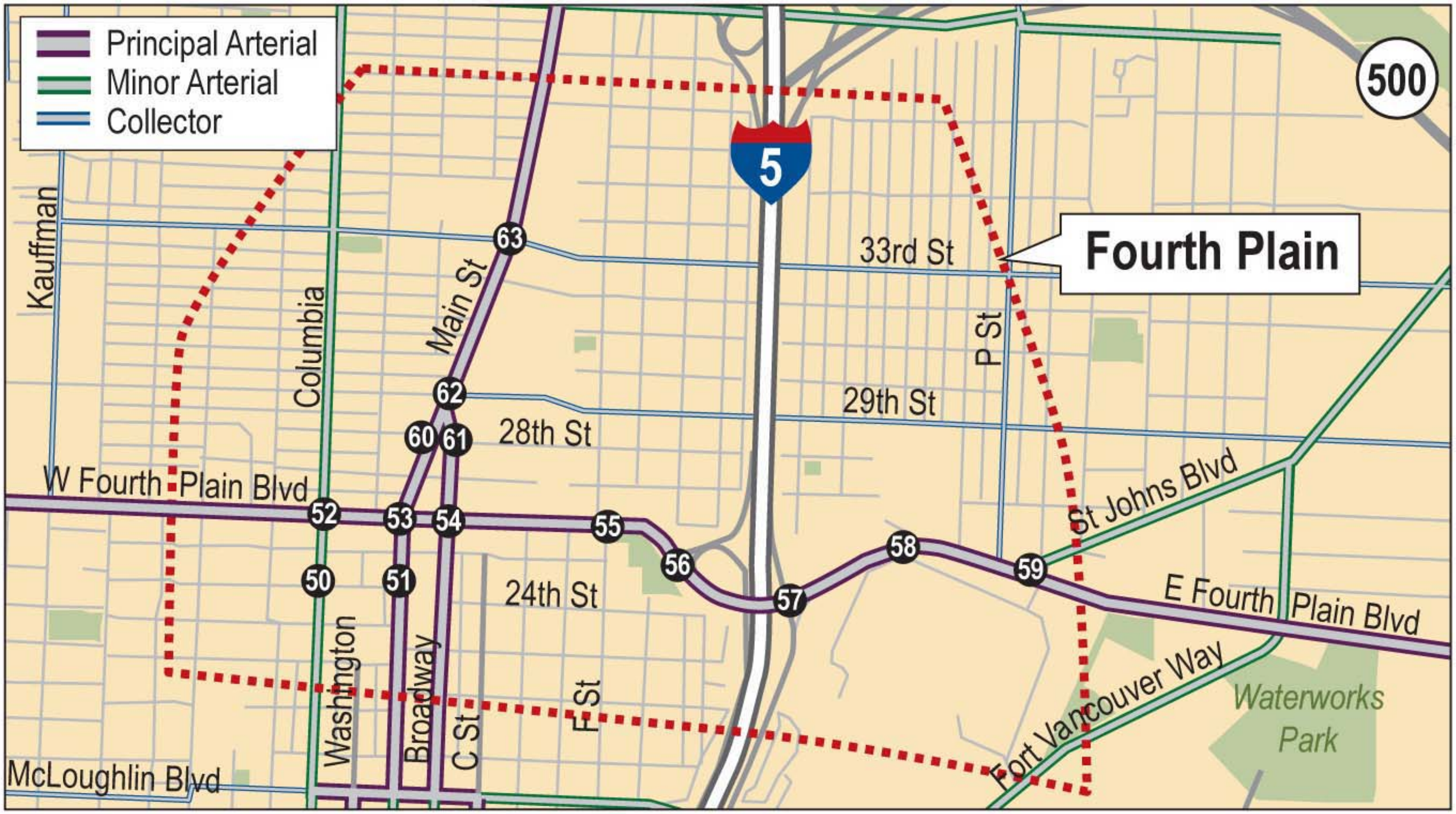


Principal Arterial	
Minor Arterial	
Collector	
1	Intersection Analyzed
Sub-areas	

No-Build
Mill Plain Interchange Sub-area

Columbia River CROSSING

Exhibit 6-34



Principal Arterial
Minor Arterial
Collector
Fourth Plain
500
5
Kauffman
Columbia
Main St
33rd St
29th St
28th St
P St
W Fourth Plain Blvd
St Johns Blvd
E Fourth Plain Blvd
24th St
Washington
Broadway
C St
F St
McLoughlin Blvd
Fort Vancouver Way
Waterworks Park
50
51
52
53
54
55
56
57
58
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63

Exhibit 6-35

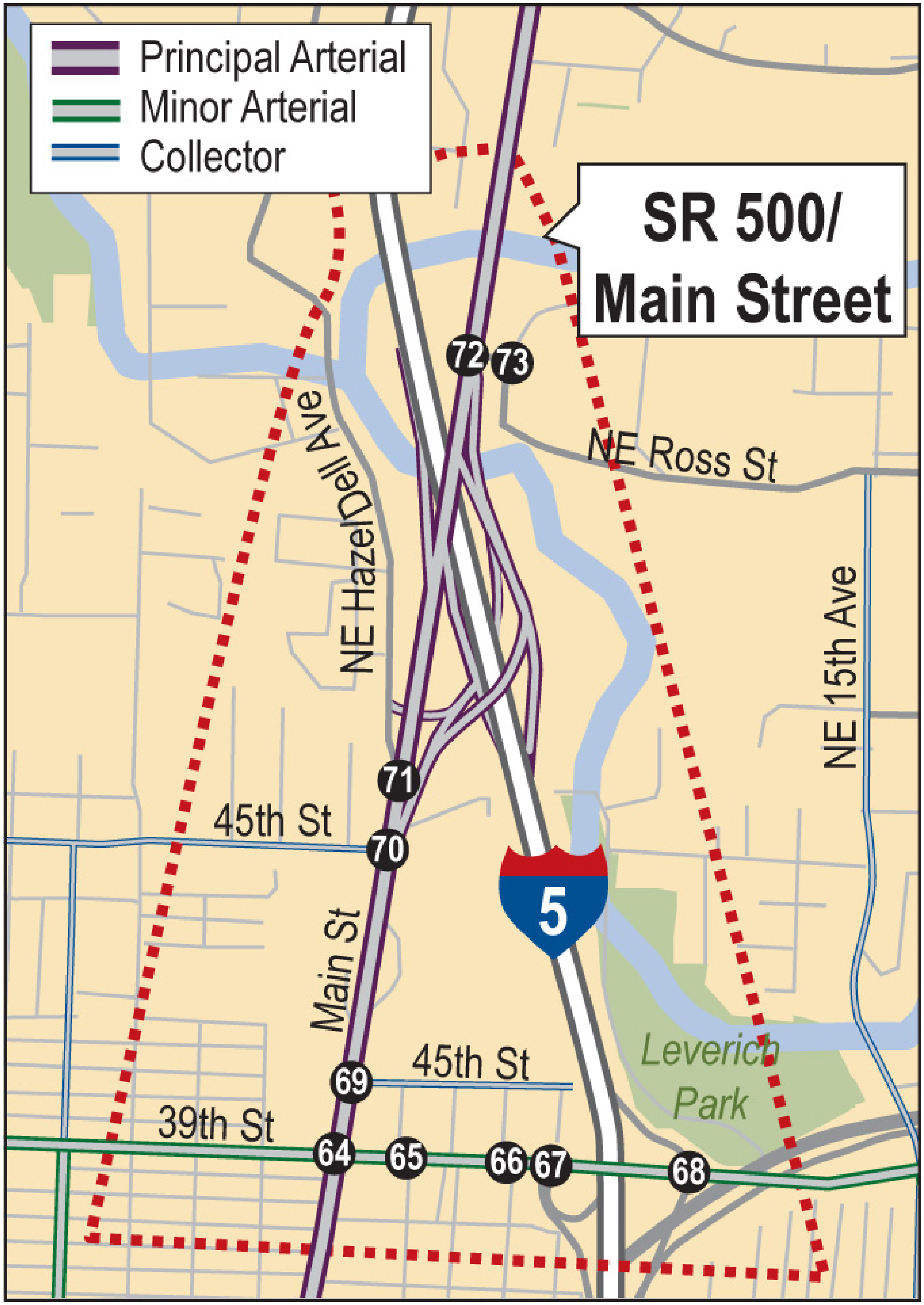

Principal Arterial
Minor Arterial
Collector
SR 500/
Main Street
NE Ross St
NE Hazel Dell Ave
NE 15th Ave
45th St
Main St
45th St
39th St
Leverich
Park
5
72
73
71
70
69
64
65
66
67
68

Exhibit 6-36

Hayden Island
N Hayden Island Dr
5
Columbia River
Hayden Island
24
25
N Marine Dr
OREGON
Principal Arterial
Minor Arterial
Urban Collector
Minor Collector

Exhibit 6-37

Portland Intersection Performance Results

AM Peak Hour		2005 Existing Conditions								2030 No-Build							
#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2,3,4]	Meets Standard	Storage Length	95% Queue (ft)	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2,3,4]	Meets Standard	Storage Length	95% Queue (ft)
01	Fremont and MLK Jr.	***Overall Intersection***	24.2	C	0.83	LOS D	Y	125	200 (WBL)	***Overall Intersection***	87.6	F	0.93	LOS D	N	125	250 (WBL)
02	Going and Interstate	***Overall Intersection***	31.7	C	0.75	LOS D	Y	125	250 (WBL)	***Overall Intersection***	52.9	D	0.88	LOS D	Y	125	275 (WBL)
								125	150 (NBL)							125	150 (NBL)
																355	450 (EBL)
03	Alberta and Interstate	***Overall Intersection***	18.0	B	0.72	LOS D	Y	100	125 (SBL)	***Overall Intersection***	27.5	C	0.73	LOS D	Y	100	150 (SBL)
04	Alberta and SB I-5 Off-Ramp	***Overall Intersection***	13.6	B	0.67	0.85	Y	175	175 (WBLT)	***Overall Intersection***	46.3	D	0.78	0.85	Y	75	125 (WBL)
																175	175 (WBT)
05	Alberta and NB I-5 Off-Ramp	***Overall Intersection***	10.1	B	0.49	0.85	Y	-	-	***Overall Intersection***	53.9	D	0.43	0.85	Y	75	100 (EBL)
06	Alberta and MLK Jr.	***Overall Intersection***	20.3	C	0.78	LOS D	Y	75	125 (WBR)	***Overall Intersection***	39.8	D	0.89	LOS D	Y	75	125 (WBR)
								100	125 (NBL)							100	150 (NBL)
																100	125 (SBL)
07	Rosa Parks and Interstate	***Overall Intersection***	18.2	B	0.54	LOS D	Y	-	-	***Overall Intersection***	20.6	C	0.62	LOS D	Y	100	125 (WBL)
08	Rosa Parks and I-5 SB On-/Off Ramps	***Overall Intersection***	18.3	B	0.52	0.85	Y	190	225 (WBL)	***Overall Intersection***	18.8	B	0.53	0.85	Y	125	150 (SWR)
09	Rosa Parks and I-5 NB On-/Off Ramps	***Overall Intersection***	11.8	B	0.39	0.85	Y	-	-	***Overall Intersection***	12.6	B	0.44	0.85	Y	-	-
10	Rosa Parks and MLK Jr.	***Overall Intersection***	17.5	B	0.66	LOS D	Y	-	-	***Overall Intersection***	14.7	B	0.70	LOS D	Y	100	150 (NBL)
11	Lombard and Interstate	***Overall Intersection***	27.8	C	0.72	0.99	Y	150	175 (WBL)	***Overall Intersection***	> 100	F	0.90	0.99	Y	150	325 (WBL)
																225	275 (NBL)
																150	275 (EBL)
																1155	1175 (EBTR)
																555	1100 (WBTR)
12	Lombard and I-5 SB On-Ramps	Eastbound Thru/Right	4.8	A	0.31	0.85	Y	-	-	Westbound Thru	12.9	B	0.42	0.85	Y	-	-
13	Lombard and I-5 NB Off-Ramps	Northbound Right	8.5	A	0.48	0.85	Y	-	-	Northbound Right	16.8	C	0.57	0.85	Y	-	-
14	Lombard and MLK Jr.	***Overall Intersection***	61.4	E	0.79	0.99	Y	100	125 (EBL)	***Overall Intersection***	> 100	F	0.88	0.99	Y	100	175 (EBL)
								100	175 (WBL)							100	175 (WBL)
								100	175 (NBL)							100	200 (NBL)
								150	300 (SBL)							150	300 (SBL)
15	Interstate and Argyle	***Overall Intersection***	22.2	C	0.61	LOS D	Y	75	125 (EBR)	***Overall Intersection***	26.7	C	0.69	LOS D	Y	75	125 (EBR)
								50	75 (NBL)							50	125 (NBL)
																150	150 (NBT)
16	Columbia Blvd and I-5 Ramps	***Overall Intersection***	17.6	B	0.62	0.85	Y	150	200 (WBR)	***Overall Intersection***	14.9	B	0.63	0.85	Y	150	200 (WBR)
17	Columbia Blvd and MLK Jr.	***Overall Intersection***	32.7	C	0.72	0.99	Y	100	200 (NBL)	***Overall Intersection***	37.2	D	0.89	0.99	Y	100	200 (NBL)
								225	250 (SBL)							225	250 (SBL)
18	Victory and Expo Road	***Overall Intersection***	2.2	A	0.22	LOS E	Y	-	-	***Overall Intersection***	2.9	A	0.22	LOS E	Y	-	-
19	Victory Blvd and I-5 SB On-Ramp	Westbound Left/Thru	1.1	A	0.17	0.85	Y	-	-	Westbound Left/Thru	1.3	A	0.21	0.85	Y	-	-
20	Victory Blvd and NB On-/Off-Ramps	***Overall Intersection***	4.0	A	0.10	0.85	Y	-	-	***Overall Intersection***	5.0	A	0.13	0.85	Y	-	-
21	Union Ct and I-5 NB Off-Ramp	Eastbound Left	7.1	A	0.24	0.85	Y	-	-	Eastbound Left	8.4	A	0.28	0.85	Y	-	-
22	Union Ct/Marine Way and Vancouver Way	***Overall Intersection***	5.8	A	0.36	LOS E	Y	-	-	***Overall Intersection***	6.4	A	0.46	LOS E	Y	-	-
23	Marine Dr and I-5 On-/Off-Ramps	***Overall Intersection***	32.8	C	0.66	0.85	Y	200	275 (NBL)	***Overall Intersection***	> 100	F	0.83	0.85	Y	200	2075 (NBL)
								125	200 (SBR)							275	350 (EBL)
24	Center Ave and I-5 SB On-/Off Ramps	***Overall Intersection***	11.0	B	0.35	0.85	Y	-	-	***Overall Intersection***	11.2	B	0.35	0.85	Y	-	-
25	Hayden Island Dr and Hayden Island Dr South	***Overall Intersection***	8.2	A	0.35	0.85	Y	-	-	***Overall Intersection***	9.5	A	0.32	0.85	Y	-	-

Delay / LOS affected by freeway congestion

Intersection queuing spills back into upstream intersection

Note 1 The ICU is used for signalized and AWSC intersections. The V/C is used for the critical movement at other intersections.

Note 2 The ODOT V/C standard of 0.85 is used for ramp terminals in the Existing and No-Build scenarios (Action 1F1)

Note 3 The ODOT V/C standard of 0.99 is used for ODOT-controlled intersections along Lombard Street (US-30) and MLK Jr. Boulevard (OR-99W), that are not ramp terminals, for the Existing, No-Build and LPA scenarios as stated in the OHP (Table 7, 2004 update).

Note 4 The PBOT operational standard for signalized intersections is LOS D and, for unsignalized intersections, is LOS E.

Exhibit 6-38

Portland Intersection Performance Results

PM Peak Hour		2005 Existing Conditions								2030 No-Build							
#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2,3,4]	Meets Standard	Storage Length	95% Queue (ft)	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2,3,4]	Meets Standard	Storage Length	95% Queue (ft)
01	Fremont and MLK Jr.	***Overall Intersection***	30.5	C	0.89	LOS D	Y	125	150 (EBL)	***Overall Intersection***	93.6	F	0.99	LOS D	N	125	175 (EBL)
								125	175 (NBL)							125	150 (NBL)
								125	150 (SBL)							125	200 (SBL)
																125	175 (WBL)
02	Going and Interstate	***Overall Intersection***	33.8	C	0.72	LOS D	Y	125	150 (NBL)	***Overall Intersection***	65.2	E	0.84	LOS D	N	125	225 (NBL)
																125	250 (WBL)
03	Alberta and Interstate	***Overall Intersection***	25.1	C	0.76	LOS D	Y	125	175 (NBL)	***Overall Intersection***	38.8	D	0.94	LOS D	Y	125	225 (NBL)
																100	150 (SBL)
																965	1150 (NBTR)
04	Alberta and SB I-5 Off-Ramp	***Overall Intersection***	10.4	B	0.63	0.85	Y	-	-	***Overall Intersection***	19.5	B	0.52	0.85	Y	75	125 (WBL)
																175	175 (WBT)
05	Alberta and NB I-5 Off-Ramp	***Overall Intersection***	10.1	B	0.70	0.85	Y	-	-	***Overall Intersection***	17.3	B	0.74	0.85	Y	75	125 (EBL)
																175	175 (EBT)
06	Alberta and MLK Jr.	***Overall Intersection***	38.0	D	0.88	LOS D	Y	75	150 (WBR)	***Overall Intersection***	71.9	E	0.91	LOS D	N	100	200 (NBL)
								100	150 (NBL)							100	200 (SBL)
								100	150 (SBL)								
07	Rosa Parks and Interstate	***Overall Intersection***	32.0	C	0.71	LOS D	Y	100	150 (WBL)	***Overall Intersection***	36.3	D	0.75	LOS D	Y	100	200 (WBL)
								175	225 (NBL)							175	225 (NBL)
08	Rosa Parks and I-5 SB On-/Off Ramps	***Overall Intersection***	15.0	B	0.48	0.85	Y	-	-	***Overall Intersection***	17.2	B	0.52	0.85	Y	125	175 (SWR)
09	Rosa Parks and I-5 NB On-/Off Ramps	***Overall Intersection***	12.7	B	0.42	0.85	Y	-	-	***Overall Intersection***	9.3	A	0.40	0.85	Y	-	-
10	Rosa Parks and MLK Jr.	***Overall Intersection***	16.5	B	0.75	LOS D	Y	100	150 (NBL)	***Overall Intersection***	16.8	B	0.84	LOS D	Y	100	150 (NBL)
11	Lombard and Interstate	***Overall Intersection***	32.4	C	0.76	0.99	Y	100	175 (NBR)	***Overall Intersection***	> 100	F	0.95	0.99	Y	100	200 (NBR)
																250	275 (SBL)
																150	250 (EBL)
																150	300 (WBL)
																225	300 (NBL)
																1150	1150 (EBTR)
12	Lombard and I-5 SB On-Ramps	Eastbound Thru/Right	3.7	A	0.36	0.85	Y	-	-	Westbound Thru	7.6	A	0.56	0.85	Y	-	-
13	Lombard and I-5 NB Off-Ramps	Northbound Right	10.7	B	0.42	0.85	Y	-	-	Northbound Right	14.9	B	0.55	0.85	Y	-	-
14	Lombard and MLK Jr.	***Overall Intersection***	74.0	E	0.85	0.99	Y	100	150 (EBL)	***Overall Intersection***	> 100	F	0.99	0.99	Y	100	200 (EBL)
								100	175 (WBL)							100	200 (WBL)
								100	225 (NBL)							100	225 (NBL)
								150	300 (SBL)							150	250 (SBL)
																1320	1325 (SBTR)
																1730	1750 (EBTR)
15	Interstate and Argyle	***Overall Intersection***	17.6	B	0.61	LOS D	Y	75	125 (EBR)	***Overall Intersection***	> 100	F	0.63	LOS D	N	1300	1300 (EBLT)
								50	75 (NBL)							50	125 (NBL)
																125	125 (NBT)
																75	150 (EBR)
16	Columbia Blvd and I-5 Ramps	***Overall Intersection***	12.6	B	0.58	0.85	Y	150	175 (WBR)	***Overall Intersection***	11.7	B	0.57	0.85	Y	-	-
17	Columbia Blvd and MLK Jr.	***Overall Intersection***	39.3	D	0.71	0.99	Y	150	175 (WBL)	***Overall Intersection***	83.5	F	0.74	0.99	Y	350	450 (WBL)
								100	225 (NBL)							100	225 (NBL)
								225	300 (SBL)							225	400 (SBL)
																150	450 (EBR)
18	Victory and Expo Road	***Overall Intersection***	4.4	A	0.32	LOS E	Y	-	-	***Overall Intersection***	45.6	E	0.39	LOS E	Y	-	-
19	Victory Blvd and I-5 SB On-Ramp	Eastbound Thru	5.5	A	0.27	0.85	Y	-	-	Eastbound Thru	27.7	D	0.28	0.85	Y	75	75 (EBT)
20	Victory Blvd and NB On-/Off-Ramps	***Overall Intersection***	56.9	E	0.32	0.85	Y	290	325 (EBL)	***Overall Intersection***	> 100	F	0.31	0.85	Y	290	775 (EBL)
								200	250 (WBTR)							850	850 (WBT)
																200	225 (WBR)
21	Union Ct and I-5 NB Off-Ramp	Eastbound Left/Thru	33.1	D	0.30	0.85	Y	200	250 (EBL)	Northbound Thru	> 100	F	0.20	0.85	Y	200	300 (EBL)
																1195	1550 (EBR)
22	Union Ct/Marine Way and Vancouver Way	***Overall Intersection***	28.3	D	0.66	LOS E	Y	75	100 (SBLTR)	***Overall Intersection***	> 100	F	0.61	LOS E	N	75	200 (SBLTR)
								370	500 (NBLT)							370	2500 (NBLT)
								370	400 (NBR)							370	2500 (NBTR)
								55	75 (SWL)							55	100 (SWL)
								55	75 (SWTR)							55	150 (SWTR)
23	Marine Dr and I-5 On-/Off-Ramps	***Overall Intersection***	55.7	E	0.69	0.85	Y	275	325 (EBL)	***Overall Intersection***	> 100	F	0.82	0.85	Y	275	400 (EBL)
								375	1150 (WBR)							2130	2150 (EBT)
																375	2925 (WBR)
																200	1525 (NBLT)
24	Center Ave and I-5 SB On-/Off Ramps	***Overall Intersection***	20.2	C	0.61	0.85	Y	115	225 (WBLT)	***Overall Intersection***	24.8	C	0.80	0.85	Y	115	225 (WBLT)
																75	125 (WBR)
25	Hayden Island Dr and Hayden Island Dr South	***Overall Intersection***	12.9	B	0.44	0.85	Y	-	-	***Overall Intersection***	69.8	E	0.67	0.85	Y	70	100 (WBLR)
																150	200 (SBL)
																820	825 (SBT)

Delay / LOS affected by freeway congestion

Intersection queuing spills back into upstream intersection

Note 1 The ICU is used for signalized and AWSC intersections. The V/C is used for the critical movement at other intersections.

Note 2 The ODOT V/C standard of 0.85 is used for ramp terminals in the Existing and No-Build scenarios (Action 1F1)

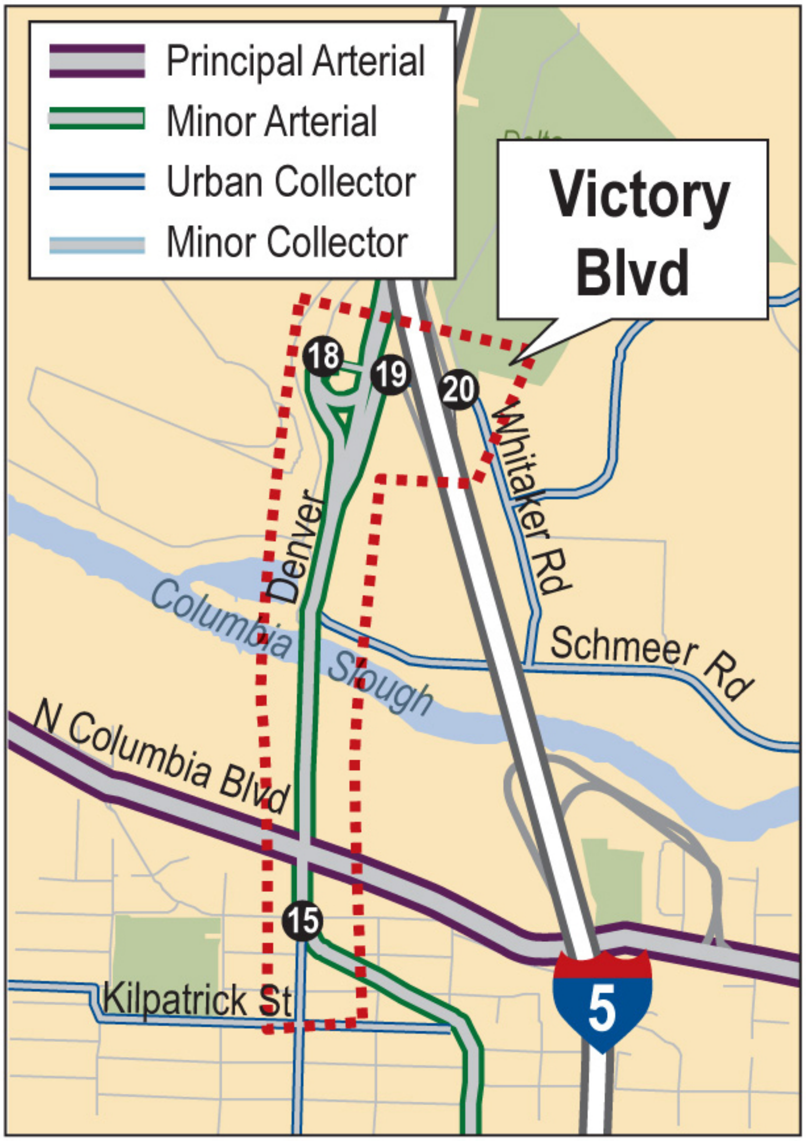
Note 3 The ODOT V/C standard of 0.99 is used for ODOT-controlled intersections along Lombard Street (US-30) and MLK Jr. Boulevard (OR-99W), that are not ramp terminals, for the Existing, No-Build and LPA scenarios as stated in the OHP (Table 7, 2004 update).

Note 4 The PBOT operational standard for signalized intersections is LOS D and, for unsignalized intersections, is LOS E.

Exhibit 6-39

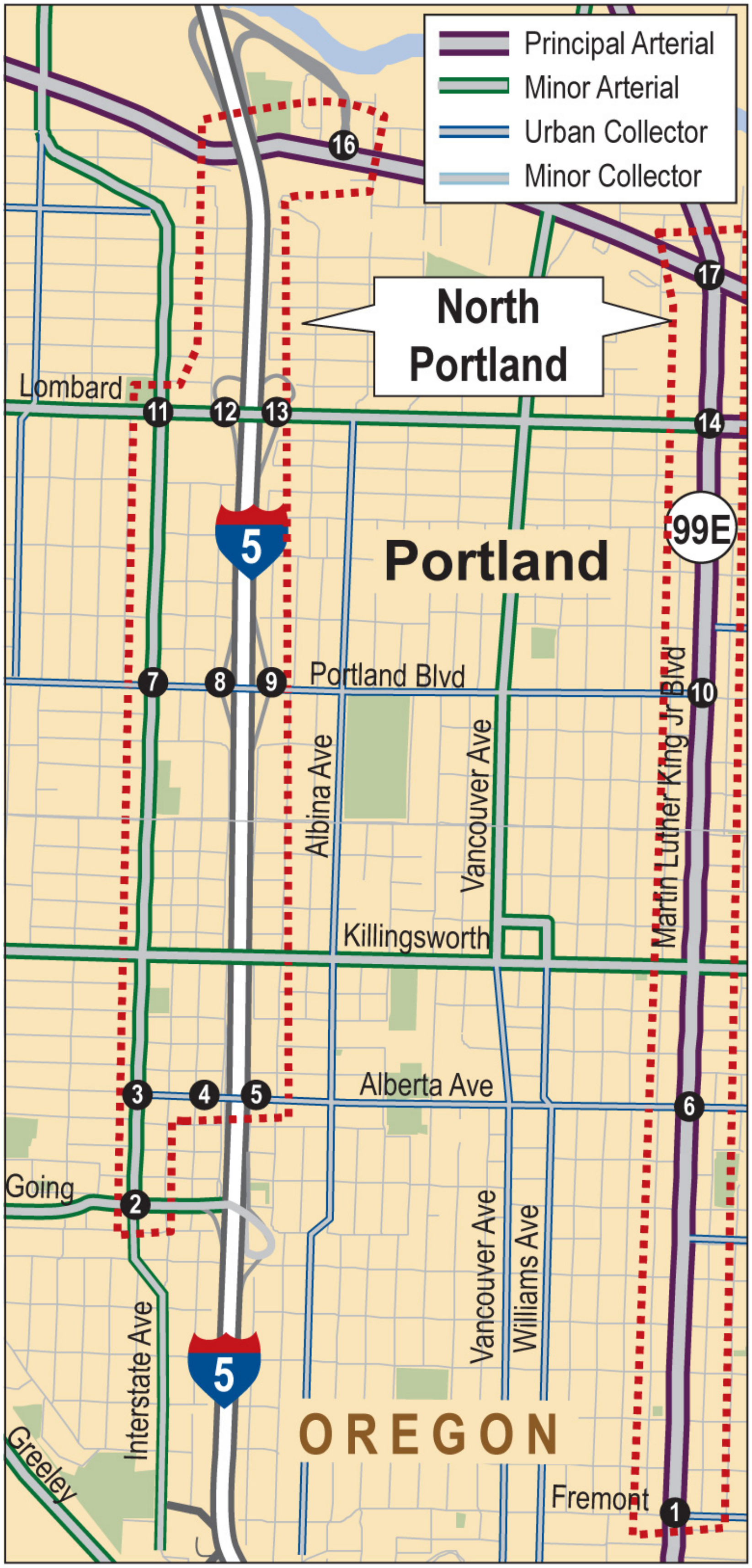

OREGON
Portland
Marine Drive
N Marine Dr
North Portland Harbor
Columbia River
N Marine Dr
Delta Park
M L K Jr Blvd
Vancouver Way
Union Ct
23
22
21
5
99E
Principal Arterial
Minor Arterial
Urban Collector
Minor Collector

Exhibit 6-40



Principal Arterial
Minor Arterial
Urban Collector
Minor Collector
Victory Blvd
18
19
20
Denver
Whitaker Rd
Columbia Slough
Schmeer Rd
N Columbia Blvd
15
Kilpatrick St
5

Exhibit 6-41



Principal Arterial
Minor Arterial
Urban Collector
Minor Collector
North Portland
Portland
OREGON
Lombard
Portland Blvd
Killingsworth
Alberta Ave
Going
Fremont
Greeley
Interstate Ave
Albina Ave
Vancouver Ave
Williams Ave
Martin Luther King Jr Blvd
5
99E
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7. Locally Preferred Alternative

7.1 Description of Locally Preferred Alternative

The Locally Preferred Alternative (LPA) represents the alternative preferred by the local and regional agencies sponsoring the CRC project. Local agency-elected boards and councils determined their preference based on the results of the evaluation in the DEIS and on the public and agency comments received both before and following its publication.

In the summer of 2008, the local agencies sponsoring the CRC project adopted the following key elements of CRC as the LPA:

- A replacement bridge as the preferred river crossing,
- Light rail as the preferred high-capacity transit mode, and
- Clark College as the preferred northern terminus for the light rail extension.

The preferences for a replacement crossing and for light rail transit were identified by all six local agencies. Only the agencies in Vancouver – the Clark County Public Transit Benefit Area Authority (C-TRAN), the City of Vancouver, and the Regional Transportation Council (RTC) – expressed a preference with regard to the Vancouver light rail terminus. Each of these agencies preferred the Clark College terminus.

The LPA includes construction of a new I-5 replacement bridge to carry highway traffic, light rail, express bus, and bicycles and pedestrians across the Columbia River. The parallel bridges that form the existing I-5 crossing over the Columbia River would be replaced by two new parallel bridges. The eastern structure would accommodate northbound highway traffic on the bridge deck, with a bicycle and pedestrian path underneath; the western structure would carry southbound traffic, with a two-way light rail guideway below. Whereas the existing bridges have only three lanes each with virtually no shoulders, each of the new bridges would be wide enough to accommodate three through-lanes and two add/drop lanes. Lanes and shoulders would be built to full design standards.

The new bridges would be high enough to provide approximately 95 feet of vertical clearance for river traffic beneath, but not so high as to impede the take-offs and landings by aircraft using Pearson Field or Portland International Airport to the east. The new bridge structures over the Columbia River would not include lift spans, and both of the new bridges would each be supported by six piers in the water and two piers on land.

The LPA includes two design options: The preferred option, LPA Option A, which includes local vehicular access between Marine Drive and Hayden Island on an arterial bridge; and LPA Option B, which does not have arterial lanes on the light rail/multi-use path bridge, but instead provides direct access between Marine Drive and Hayden Island with collector-distributor (CD) lanes on the two new bridges that would be built adjacent to I-5.

The primary transit element of the LPA is a 2.9-mile extension of the current Metropolitan Area Express (MAX) Yellow Line light rail from the Expo Center in North Portland, where it currently ends, to Clark College in Vancouver. The transit element would not differ between LPA and LPA with highway phasing. To accommodate and complement this major addition to the region's transit system, a variety of additional improvements are also included in the LPA:

- Three park-and-ride facilities in Vancouver near the new light rail stations.
- Expansion of Tri-County Metropolitan Transportation District's (TriMet's) Ruby Junction light rail maintenance base in Gresham, Oregon.
- Changes to C-TRAN local bus routes.
- Upgrades to the existing light rail crossing over the Willamette River via the Steel Bridge.

7.1.1 LPA with highway phasing

Depending on the availability of funding, construction of several elements of the LPA could be deferred to some later date. As such, this FEIS technical report evaluates two versions of the LPA, including the LPA and the LPA with highway phasing option. The LPA with highway phasing option would build most of the LPA in the first phase, and would defer construction of specific elements of the project to some future undetermined date as summarized in **Section 2.1.2.1** and **Section 2.1.2.2**. When the results differ between the LPA and LPA with highway phasing alternative, the results are differentiated at the bottom of each section. The LPA with highway phasing option is referred to as LPA Phase I in project exhibits.

7.2 I-5 and I-205 Performance

This section summarizes highway performance for the LPA as well as the LPA with highway phasing alternative in year 2030.

7.2.1 Daily Traffic Levels

The highway performance results described in this chapter assume that tolls would be collected at the I-5 crossing using an electronic toll collection system. For more information on toll collection or estimated daily traffic levels if no tolls were collected, or if tolls were collected at both the I-5 and I-205 crossings, see Chapter 8.

Average weekday traffic across the I-5 crossing in 2030 is expected to be 178,500 vehicles under the LPA, lower than the 184,000 daily vehicle trips expected under No-Build conditions. Lower traffic would be due to vehicle-trip reductions with the provision of high-capacity transit and because of tolling. Interstate 205 traffic volumes would increase from 210,000 vehicles per day under the No-Build conditions to 214,500 vehicles with the LPA. **Exhibit 7-1** summarizes ADT volumes on the I-5 bridge, the I-205 bridge, and the total river crossing.

The daily traffic levels under the LPA with highway phasing are expected to be similar to the LPA scenario.

7.2.2 Traffic Demand – Vehicles

This section compares traffic demand between the forecast No-Build and LPA in the year 2030 using four-hour peaks.

Freeway traffic volumes were developed using the seven-step process summarized in the No-Build **Section 6.2.2**. The local roadway traffic volumes for Portland were developed using the five-step process also summarized in the No-Build **Section 6.2.2**.

The growth rates in the Vancouver study area were reviewed with, and agreed upon by, the City of Vancouver staff and were consistent with the adopted VCCV plan. The agreed-upon growth rates were applied to existing traffic volumes to forecast 2030 background traffic volumes. This resulted in traffic growth of approximately 50 percent in the morning and afternoon/evening peak periods over the 25-year period, which is approximately two percent per year.

Trips utilizing park-and-ride facilities were generated for each of the facilities for the peak hour of adjacent street traffic. The trip generation rates were assumed to be similar to existing park and ride facilities located throughout the Portland/Vancouver metropolitan region. Park-and-ride trips were then assigned to the roadway network based upon origin and destination travel patterns. The origin and destination patterns for the park-and-ride trips were based on forecasts from the regional demand model.

7.2.2.1 Vehicle Demands on I-5

Exhibit 7-2 compares the vehicle demands for the four-hour morning peak period in the southbound direction for the existing, No-Build, the LPA with highway phasing and LPA scenarios. The general pattern of traffic volume fluctuations along the corridor remains similar among the scenarios.

North of the Interstate Bridge, the LPA would result in increased southbound vehicle demand relative to the No-Build Alternative during the four-hour morning peak. In the vicinity of the SR 500 interchange, the LPA is forecast to have a four-hour volume 6,000 vehicles (24 percent) higher than the No-Build Alternative. Much of the travel demand volume increase can be attributed to the additional capacity of I-5 in this location; the additional capacity results in lesser traffic diversion to Main Street and other local streets in Vancouver. At the Interstate Bridge, the LPA traffic demand is only about 900 vehicles (three percent) higher than the No-Build traffic demand.

South of the Interstate Bridge, traffic demand volumes between the LPA and No-Build Alternative are nearly the same. For example, south of the Victory Boulevard interchange, the traffic demand for the LPA is about 800 vehicles (six percent) higher than the No-Build Alternative. South of the Going Street interchange, the traffic demand for the LPA is about 300 vehicles (one percent) higher than the No-Build Alternative.

Exhibit 7-3 illustrates the northbound four-hour morning peak period traffic demand. Throughout the project corridor, northbound I-5 traffic demand is forecast to decrease during the morning peak compared with the No-Build Alternative. For example, in the vicinity of the Going Street interchange, vehicle demand is forecast to be about 1,400 fewer vehicles (eight percent less) than the No-Build Alternative. Crossing the Interstate Bridge, northbound traffic demand for the LPA is forecast to be lower by 1,800 vehicles (10 percent) than the No-Build Alternative during the four-hour morning peak. These decreases relative to the No-Build Alternative can be attributed to the increased transit use in the corridor and the imposition of tolls with the LPA scenario.

Exhibit 7-4 illustrates the traffic demand for the southbound afternoon/evening peak period. Traffic demand forecasts of the No-Build and LPA scenarios are similar throughout the corridor. In some sections of I-5 the No-Build has higher demands while in others the LPA scenario has higher demands. In the vicinity of SR 500, for example, the forecast for the LPA is about 800 vehicles (four percent) higher than the No-Build Alternative. Southbound traffic demands across the I-5 bridge during the four-hour afternoon/evening peak are forecast to be 2,000 vehicles lower (10 percent) for the LPA than the No-Build. This can be attributed to higher transit usage and tolls with the LPA.

Exhibit 7-5 illustrates the northbound traffic demands during the four-hour afternoon/evening peak period. Through much of North Portland, northbound traffic demand is slightly higher with the LPA than the No-Build Alternative. In the vicinity of Going Street, for example, the traffic demand for the LPA is about 1,000 vehicles (four percent) higher than the No-Build Alternative. At the Interstate Bridge, the traffic demand for the LPA is forecast to be about 2,600 vehicles (nine percent) higher than the No-Build Alternative. Through much of Vancouver, the traffic demand for the LPA is higher than for the No-Build. In the vicinity of 39th Street, for example, the traffic demand for the LPA is forecast to be about 5,300 vehicles (23 percent) higher than the No-Build Alternative. The higher traffic demand is attributable to the increased capacity on I-5 in this area and the lesser diversion to adjacent parallel arterials including Interstate Avenue, Martin Luther King Jr. Boulevard, Main Street and other local streets.

7.2.2.2 Vehicle Demand on I-205

This section compares traffic demand in the I-205 corridor in the year 2030 using two-hour peak periods. It provides information on the existing, No-Build, and LPA scenarios. Travel demands in the I-205 corridor are the same for LPA with highway phasing and LPA scenarios.

Exhibit 7-6 illustrates the southbound I-205 traffic demand for the two-hour morning peak. At most locations along the corridor, the traffic demand for the LPA is about 1,000 vehicles (five percent) lower than the No-Build Alternative. This reduction can be attributed to the provision of high-capacity transit and tolling on I-5 that are forecast to reduce overall southbound volumes for both I-205 and I-5 during the two-hour morning peak.

Exhibit 7-7 illustrates the traffic demand for the northbound two-hour morning peak period. The traffic demand for the LPA is higher than the No-Build Alternative. The traffic demand for the LPA is about 700 vehicles (five percent) higher than the No-Build Alternative in the vicinity of I-84 and about 1,400 vehicles (20 percent) higher than the No-Build Alternative crossing the Columbia River. The increased volume with the LPA can be attributed to diversion from I-5 to I-205 due to the tolling of I-5, as well as the relatively free-flowing conditions forecast for northbound I-205 during the morning peak.

Exhibit 7-8 illustrates the traffic demand for southbound I-205 during the two-hour afternoon/evening peak. The southbound afternoon/evening traffic demand for the LPA is generally higher than the No-Build Alternative. Across the Columbia River, the traffic demand for the LPA is about 1,100 vehicles (10 percent) higher than the No-Build Alternative. This can be attributed to the free-flowing conditions on southbound I-205 during the afternoon/evening off-peak period and the tolling of I-5.

Exhibit 7-9 illustrates the traffic demand for northbound I-205 during the two-hour afternoon/evening peak. The traffic demand for the LPA is slightly lower than for the No-Build Alternative. Along much of the corridor, the LPA is forecast to have volumes of 800 fewer vehicles (about five to 10 percent less) than the No-Build Alternative. Capacity improvements identified under the LPA for I-5, combined with the forecast congestion along I-205, accounts for the forecast vehicle demand reduction along I-205.

7.2.3 Traffic Demand – Truck Freight

Daily truck travel demand would be similar for the No-Build and LPA because the movement of freight is substantially related to economic conditions in the region, and freight moved by trucks is not likely to shift travel modes due to congestion. However, truck demands by time of day would likely change because there would be fewer congested hours under the LPA, resulting in more trucks during the commuter peak and midday hours.

Year 2030 daily truck volumes were distributed to each hour of the day to develop an hourly truck volume forecast for the LPA. The hourly volumes are based on existing hourly truck volumes, predicted levels of congestion (see **Section 7.2.4**) and the number of congested hours. Congestion is defined in this report as travel speeds less than 30 mph.

The LPA would result in higher volumes of trucks during midday operations compared to the No-Build Alternative. The reduction in congestion and truck travel occurring throughout the day would mean more flexibility in truck scheduling and improved reliability of truck shipments. **Exhibit 7-10** summarizes the truck volumes by time of day.

The truck freight traffic demands would be similar for the LPA and the LPA with highway phasing options.

7.2.3.1 Truck Operating Characteristics

The rate of growth for truck traffic over the Interstate Bridge is predicted to be higher than the rate of growth for general purpose traffic (77 percent growth for trucks compared to 32 percent for general purpose traffic), which would result in an increase in the proportion of trucks in the overall traffic stream. Due to their size and maneuverability, large trucks, on average, operate equivalent to 2.5 passenger cars on highways such as I-5 within the Bridge Influence Area. Therefore, the proportion of highway capacity used by trucks will be greater than today. The LPA would improve highway geometries such as uphill ramp grades, super-elevation, and merge distances to current standards. Truck speeds at interchanges and at the merge points with mainline I-5 would be higher than for the existing or No-Build conditions, resulting in reduced congestion from slow-moving trucks.

7.2.3.2 Oversized Loads

The LPA would be constructed to meet standard clearance heights for a federal interstate facility and ramps would be designed for the wider turns required by oversized loads.

7.2.4 Effect of Congestion

This section compares congestion between the forecast No-Build and LPA conditions in the year 2030, using four-hour peak periods.

7.2.4.1 Duration of Congestion on Southbound I-5

The LPA would reduce southbound congestion on the Interstate Bridge from 7.25 hours under No-Build conditions to 3.5 hours, as shown **in Exhibit 7-11**. The traffic congestion remaining at the bridge would result because of an existing downstream bottleneck on I-5 just north of the I-405 split. The LPA would not exacerbate or worsen this existing bottleneck, although the CRC improvements would enable an increase in vehicular throughput of about six percent along I-5 just north of the I-405 split.

The LPA would reduce southbound congestion near the I-405 split from 11 hours under No-Build conditions to 8.25 hours. Similarly, the effects of the southbound bottleneck located near the I-5 lane drop in the Rose Quarter would remain, with approximately 3.75 hours of congestion.

The duration of congestion on southbound I-5 at the Interstate Bridge would be similar for the LPA and the LPA with highway phasing options, as shown in **Exhibit 7-12**. The two bottlenecks south of the bridge would be similar to the LPA.

7.2.4.2 Duration of Congestion on Northbound I-5

The LPA would eliminate the northbound I-5 crossing bottleneck. Northbound traffic queues would no longer extend to I-405 for multiple hours each day. The LPA would reduce the duration of congestion at the I-5 crossing from 7.75 hours to less than two hours each day (see **Exhibit 7-13**).

The other two bottlenecks located near the I-405/Rose Quarter weaving area and the Marquam Bridge would operate similar to No-Build conditions.

The duration of congestion on northbound I-5 would be similar for the LPA and the LPA with highway phasing options at the Interstate Bridge, near the I-405/Rose Quarter weaving area, and near the Marquam Bridge (see **Exhibit 7-14**). The LPA with highway phasing option would result in over two hours of congestion between SR 14 and SR 500 during the afternoon/evening peak hour compared to the LPA (see **Exhibits 7-13** and **7-14**). The cause of this new congestion spot is high afternoon/evening volumes and the amount of lane changing occurring between SR 14 and SR 500. The LPA with highway phasing has one less add/drop lane in this area requiring additional lane changes resulting in more congestion.

7.2.5 Travel Times

This section compares travel times between the forecast No-Build and LPA conditions in the year 2030 calculated during the two-hour peak periods in the direction of peak traffic flow.

7.2.5.1 Travel Time along I-5

The travel time comparisons are presented for two different segments of I-5: SR 500 to Columbia Boulevard (about 4.7 miles) and from 179th Street to I-84 (about 16.2 miles). The calculated peak period travel times are provided for the Existing, No-Build, the LPA with highway phasing, and the LPA scenarios. Morning peak travel times are calculated for the southbound direction; afternoon/evening peak travel times are calculated for the northbound direction.

Exhibit 7-15 illustrates the travel time on southbound I-5 during the morning peak period. Relative to the No-Build scenario, the LPA would result in a one minute (five percent) decrease in southbound I-5 travel time from SR 500 to Columbia Boulevard. For the longer segment from 179th Street to I-84, the LPA is calculated to produce a time savings of eight minutes (17 percent) relative to the No-Build scenario. Note that the bottleneck north of the I-405 split would occur under both the LPA and No-Build scenarios during the two-hour morning peak, affecting travel times in the corridor. Notwithstanding the downstream bottleneck, the geometric and operational highway improvements in the LPA allow traffic headed southbound from Vancouver to Portland to flow more freely.

Though they are not illustrated in the exhibit, travel times for I-5 trips that originate from SR 500, SR 14, and Mill Plain, cross the Interstate Bridge, and exit I-5 at the Marine Drive interchange also receive benefits of reduced travel time from the LPA compared with the No-Build Alternative. The LPA eliminates the bottleneck caused by the existing bridge and ramps joining I-5 from SR 14. Since trips exiting I-5 at Marine Drive do not travel far enough south to encounter the congestion originating at the bottleneck created by the I-5/I-405 split, these trips accrue a measurable benefit though their I-5 time savings is not much due to the short distance they travel on I-5.

Exhibit 7-16 illustrates the northbound travel times during the two-hour afternoon/evening peak. The travel time improvements are much more pronounced in the northbound direction during the afternoon/evening peak period than in the southbound direction during the morning peak period because northbound traffic is unaffected by a downstream bottleneck. Relative to the No-Build scenario, travel times for the LPA are predicted to improve by eight minutes (57 percent) from Columbia Boulevard to SR 500 and by 20 minutes (45 percent) from I-84 to 179th Street.

The northbound and southbound travel times along I-5 would be similar for the LPA and the LPA with highway phasing options.

7.2.5.2 Travel Time along I-205

Travel time in the I-205 corridor is presented for the segment from SR 500 to the westbound I-84 interchange (about 10.2 miles). Travel time information is also provided for the northerly portion from SR 500 to mid-point of the Glenn Jackson Bridge over the Columbia River (about 5.5 miles) and from the mid-point of the bridge to westbound I-84 (about 4.7 miles). Like the travel times for I-5, the travel times for the I-205 corridor are presented for the peak direction travel during the morning or evening peaks. The morning peak period travel time is reported for the southbound direction and the afternoon/evening peak period travel time is presented for the northbound direction.

For the entire 10.2-mile corridor, southbound I-205 travel times during the two-hour morning peak are forecast to decrease by two minutes (six percent) from SR 500 to I-84 for the LPA compared to the No-Build Alternative (see **Exhibit 7-17**). The reduction in travel time is attributed to decreased demands along I-205 resulting from a shift of traffic to I-5 due to reduced congestion in that corridor.

Northbound I-205 travel times from I-84 to SR 500 would remain similar under both the 2030 LPA and 2030 No-Build scenarios during the two-hour afternoon/evening peak (see **Exhibit 7-18**).

The northbound and southbound travel times along I-205 would be similar for the LPA and the LPA with highway phasing options.

7.2.6 Service Volumes

This section compares service volumes between the forecast No-Build and LPA conditions in the year 2030, using four-hour peak periods.

7.2.6.1 Vehicle Throughput (Served Volume) on Southbound I-5

As shown in **Exhibit 7-19**, southbound vehicle throughput along I-5 near the Pioneer Street interchange would be similar under the LPA and No-Build scenarios during the four-hour morning peak.

Southbound I-5 vehicle throughput near the SR 500 interchange during the four-hour morning peak would increase by almost 7,700 vehicles (35 percent) for the LPA. Although the LPA would serve more traffic volume, it would not serve the entire forecast demand due to a downstream bottleneck located north of the I-405 split. However, the percentage served would be higher than the No-Build Alternative.

Southbound I-5 vehicle throughput on the Interstate Bridge during the four-hour morning peak would increase by around 3,600 vehicles (16 percent) over the No-Build Alternative, even though the vehicle demand between alternatives would remain constant.

While the southbound Interstate Bridge bottleneck would be eliminated under the LPA, recurrent traffic congestion from the downstream bottleneck located just north of the I-405 split would limit the traffic volume served across the I-5 bridge to about 97 percent of its demand during the four-hour morning peak period.

In addition, southbound I-5 vehicle throughput north of the I-405 split would serve about 1,200 more vehicles (five percent) during the four-hour morning peak under the LPA than the No-Build condition. Both alternatives are forecast to serve approximately 90 percent of their demand near the I-405 split.

The vehicle throughput on southbound I-5 would be similar for the LPA and the LPA with highway phasing options.

7.2.6.2 Vehicle Throughput (Served Volume) on Northbound I-5

During the four-hour afternoon/evening peak, northbound I-5 vehicle throughput north of I-405 would increase by over 4,700 vehicles (30 percent) compared to No-Build conditions (see **Exhibit 7-20**). Although the vehicle demand would be similar for the two alternatives, the LPA would remove the bottleneck at Interstate Bridge, resulting in improved service volumes for northbound I-5.

Similarly, northbound I-5 vehicle throughputs on the Interstate Bridge and near SR 500 would increase substantially over the No-Build Alternative. The volume served during the four-hour afternoon/evening peak would increase by 9,100 vehicles (45 percent) and 12,400 vehicles (51 percent), respectively.

Northbound vehicle throughputs along I-5 near the Pioneer Street interchange would be similar under LPA and No-Build conditions during the four-hour afternoon/evening peak.

The vehicle throughput on northbound I-5 would be similar for the LPA and the LPA with highway phasing options.

7.2.7 Served vs. Unserved Ramp Volumes

This section compares ramp volumes between the forecast No-Build and LPA conditions in the year 2030, using four-hour peak periods.

7.2.7.1 Served vs. Unserved Ramp Volumes on Southbound I-5

During the four-hour morning peak, the number of southbound on-ramps in the Bridge Influence Area that would have unserved volumes would decrease from three (SR 500/39th Street, Mill Plain Boulevard, and SR 14/City Center) under No-Build conditions to one (SR 14/City Center) under the LPA, as shown in **Exhibit 7-21**. The unserved volume for the LPA would be due to the lane drop on the southbound I-5 Bridge resulting in additional congestion at the SR 14/City Center on-ramp. The number of unserved vehicles under the LPA design would be similar to existing 2005 conditions and less than 2030 No-Build conditions. The decrease in number of ramps with unserved vehicles would be due to the reduced congestion forecast for southbound I-5 during the morning peak under the LPA.

The ramps with unserved volumes would be the same for the LPA and the LPA with highway phasing.

7.2.7.2 Served vs. Unserved Ramp Volumes on Northbound I-5

During the four-hour afternoon/evening peak, the number of northbound on-ramps in the Bridge Influence Area that would have unserved volumes would decrease from five (Interstate Avenue/Victory Boulevard, Marine Drive, Hayden Island, Mill Plain Boulevard, and Fourth Plain Boulevard) to one (Mill Plain Boulevard) under the LPA, as shown in **Exhibit 7-22**. This decrease would be due to the reduced congestion forecast for northbound I-5 during the afternoon/evening peak under the LPA.

Similarly, under the LPA with highway phasing option the Mill Plain Boulevard northbound on-ramp would be the only ramp with unserved vehicles. The amount of unserved vehicles would be similar to the LPA option and much less than the No-Build alternative.

7.2.8 Person Throughput

Under the LPA, in year 2030 about 29,200 persons in southbound vehicles would be expected to use the I-5 crossing during the four-hour morning peak, an increase of 18 percent over No-Build conditions. With the provision of high-capacity transit up to 7,550 persons under the LPA option are forecast to be using transit during the four-hour morning peak.

Northbound, in year 2030 about 35,300 persons in vehicles would be expected to use the I-5 crossing under the LPA during the four-hour afternoon/evening peak, an increase of 33 percent over No-Build conditions. With the provision of high-capacity transit, up to 6,100 persons under the LPA option are forecast to be using transit during the four-hour afternoon/evening peak. **Exhibit 7-23** shows total person throughput data including auto and transit trips.

Under the LPA with highway phasing option, about 28,600 persons in southbound vehicles would be expected to use the I-5 crossing during the four-hour morning peak, an increase of 15 percent over No-Build conditions. The amount of transit users under the LPA with highway phasing option is forecast to slightly decrease to 7,500 persons during the four-hour morning peak.

The person throughput in vehicles and on transit for northbound I-5 during the four-hour afternoon/evening peak would be similar for the LPA and the LPA with highway phasing options.

7.2.9 Managed Lanes Along I-5

Managed lanes are a fairly common feature on major highways in large metropolitan areas. In contrast with general purpose lanes open to all users, managed lanes are for preferential or exclusive use and are most often reserved for high-occupancy vehicles (HOVs). On some highways, managed lanes can be used by motorcyclists and certain hybrid vehicles. Some areas of the country are experimenting with truck-only managed lanes.

Managed lanes are intended to save time for bus riders, carpoolers, and motorcyclists by enabling them to bypass areas of traffic congestion. Managed lanes increase highway efficiency by moving more people in fewer vehicles than general purpose lanes. Managed lanes allow more reliable highway travel times and help carpools and buses maintain their schedules. Managed lanes reduce single-occupant vehicle trips, overall highway demand, and the burden on the environment from greenhouse gas emissions. Managed lanes are a crucial component of offering sustainable transportation alternatives to solo driving.

On I-5, a managed lane exists northbound between Going Street and Marine Drive. The 3.2-mile lane is reserved for high-occupancy vehicle (HOV) use between 3:00 and 6:00 p.m. on weekdays. During this three-hour period, vehicles with two or more people, buses, and motorcyclists are allowed to use the lane.

The 2030 No-Build, LPA, and LPA with highway phasing options assume the current 3.2-mile HOV lane, the majority of which is located south of the project area, would remain in place through the year 2030.

Including new managed lanes on I-5 within the CRC project area would not offer operational benefits for most users, including carpools or trucks. This is due to a number of factors:

- Because of the substantial amount of traffic entering from on-ramps or exiting to off-ramps within the project area, many eligible users would not be inclined to navigate to and from a managed lane located to the inside of the highway.
- A managed lane for southbound users would terminate into a general purpose lane just south of the CRC project area, but traffic is expected to backup through the general purpose lane throughout most of the morning peak period, which would cause congestion and back-ups within the managed lane.
- A managed lane for northbound users would not offer enough time savings to be effective. For example, under the LPA and LPA with highway phasing options all of the general purpose lanes are forecast to operate at nearly free-flow conditions, with less than two hours congestion.

For the above three reasons, it is likely that only a small portion of all eligible users would use an inside managed lane along I-5 within the CRC project area. If managed lanes were positioned to be the outside lanes on the highway instead of the inside lanes, the significant volumes of traffic entering from on-ramps and/or exiting to off-ramps within the CRC area would create congestion and conflicts with managed lane users.

While managed lanes would not offer operational benefits for most users within the CRC project area, the LPA and LPA with highway phasing options could be flexible enough to allow future managed lanes within the project area if it were part of a comprehensive, system-wide network of managed lanes north and south of the CRC area (e.g., between 179th Street and I-405).

7.2.10 Safety

The LPA would address most of the non-standard geometric and safety design features for I-5's mainline and ramps within the Bridge Influence Area. Improvements would be made to the existing short on-ramp merges/acceleration lanes and off-ramp diverges/deceleration distances, short weaving areas, substandard lane widths, vertical and horizontal curves that limit sight distance, and narrow or non-existent shoulders. The LPA would remove both Interstate Bridge lift spans. In addition, the LPA would substantially reduce traffic congestion in the Bridge Influence Area compared to No-Build conditions.

As the number of vehicular collisions in the I-5 Bridge Influence Area is related to the presence of non-standard geometric design and safety features, which is exacerbated when traffic levels are at or near congested conditions, the LPA would substantially improve traffic safety in the Bridge Influence Area. It is estimated that the project would reduce average annual yearly collisions in the Bridge Influence Area from 750 under the No-Build Alternative to between 210 and 240 in the LPA.

This estimate was calculated by making the assumption that the highway geometric and safety improvements made in the Bridge Influence Area would result in a highway corridor that performed at least as good as an average, similar type of urban interstate facility in Oregon. The collision rate for a similar urban, interstate facility is approximately 0.55 collisions per MVMT. Applying this rate (with an allowance for a higher collision rate during congested periods and during late evening and early morning hours) to the forecasted traffic volumes over a year period generated an estimated annual collision total of between 210 and 240.

The safety findings would be similar for the LPA and the LPA with highway phasing options.

7.3 Local Streets

7.3.1 Travel Demand

This section compares travel demand on local streets between the forecast No-Build and LPA conditions in the year 2030. The information is reported for the one-hour peak periods. In general, local street traffic demands will decrease under the LPA as compared to the No-Build Alternative because the congestion on I-5 will be lessened; thereby shifting regional trips back to the highway instead of using local roads.

7.3.1.1 Vancouver Screenlines – Morning Peak Hour

During the morning peak, eastbound and westbound traffic west of I-5 would increase between 10 and 20 percent over No-Build conditions as shown in **Exhibit 7-24**. With the LPA, eastbound and westbound traffic east of I-5 would increase by up to five percent over No-Build conditions. Under the LPA with highway phasing, eastbound traffic east of I-5 would increase by approximately 30 percent and westbound traffic east of I-5 would remain relatively unchanged. The difference in eastbound traffic between the LPA and LPA with highway phasing would be due to the addition of the direct connect ramp from southbound I-5 to eastbound SR 500. Without the direct connect ramp, eastbound traffic would remain on 39th Street to access SR 500.

During the morning peak, southbound traffic in Vancouver would decrease between 10 and 35 percent along most major streets with the exception of the downtown area. Southbound traffic in downtown is expected to increase over the No-Build by approximately 10 percent. The decrease in southbound traffic on local streets would be caused by the improvements to I-5, which would encourage through traffic that has been observed to divert to arterial streets due to congestion on I-5 to return to I-5.

Northbound traffic south of Fourth Plain Boulevard would increase between five and 20 percent. Northbound traffic north of 39th Street would increase by approximately 80 percent (450 vehicles) compared to No-Build conditions. This would occur due to the closure of the 39th Street on-ramp to I-5 northbound; vehicles would use the arterial street network to access the northbound I-5 on-ramp at Main Street.

7.3.1.2 Vancouver Screenlines – Afternoon/Evening Peak Hour

During the afternoon/evening peak, traffic volumes along key east-west local streets west of I-5 would remain unchanged and/or increase by approximately 20 percent over No-Build conditions as shown in **Exhibit 7-25**. Under the LPA, westbound traffic just east of I-5 would increase by approximately 15 percent and eastbound traffic just east of I-5 would decrease by approximately 25 percent compared to No-Build conditions. Under LPA with highway phasing, eastbound traffic would decrease by approximately 10 percent. The difference in eastbound traffic between the LPA and LPA with highway phasing would be due to the addition of the direct-connection ramp from southbound I-5 to eastbound SR 500. Without the direct-connection ramp, eastbound traffic would remain on 39th Street to access SR 500.

During the afternoon/evening peak hour, southbound traffic in Vancouver, depending on location, would remain unchanged or could increase up to 20 percent. Under the LPA, the southbound off-ramp to 39th Street would be removed and replaced with the new southbound SR 500 off-ramp, which would cause traffic to shift from southbound I-5 to southbound Main Street to access the neighborhood.

Northbound traffic in Vancouver would decrease between five and 30 percent relative to No-Build conditions, with the highest decrease north of the Fourth Plain interchange area.

7.3.1.3 Portland Screenlines – Morning Peak Hour

During the morning peak, westbound traffic on both sides of the highway would decrease less than 10 percent compared to No-Build conditions as shown in **Exhibit 7-26**. Eastbound traffic on both sides of I-5 would increase up to 10 percent, with the higher growth forecast for the eastside of I-5.

During the morning peak, southbound traffic in Portland would decrease by up to five percent over No-Build conditions. Northbound traffic in Portland would remain unchanged or decrease between 10 and 20 percent compared to No-Build conditions.

7.3.1.4 Portland Screenlines – Afternoon/Evening Peak Hour

During the afternoon/evening peak, eastbound and westbound traffic on both sides of the highway would change by less than 10 percent compared to No-Build conditions as shown in **Exhibit 7-27**. Northbound and southbound traffic in Portland would change by less than 10 percent during the afternoon/evening peak hour.

7.3.2 Intersection Operational Performance

This section compares intersection operational performance between the forecast No-Build and LPA conditions in the year 2030, considering one-hour peak periods.

Exhibit 7-28 summarizes the applicable LOS and V/C performance criteria used when comparing year 2030 project conditions against No-Build conditions for the study intersections. The criteria recognizes under No-Build conditions some local intersections may operate at unacceptable conditions and that mitigation would not be required under the LPA options if either caused no further degradation to these intersections.

In addition to intersection LOS and/or V/C ratios, vehicular queuing impacts would be significant when, under the LPA option, a traffic lane's storage distance is exceeded, but would not be exceeded under No-Build conditions. Similarly, significant queuing impacts would result if the resulting vehicle queue extends into upstream intersection, but would not under No-Build conditions.

7.3.2.1 Vancouver Operational Performance – Morning/Afternoon Peak Hour

The LPA includes improvements to the four interchanges along I-5 in Vancouver including SR 14, Mill Plain, 4th Plain, and SR 500. These improvements include some reconfiguration of adjacent local streets to complement the new interchange designs, as well as new facilities for bicyclists and pedestrians within and along this corridor.

Interchanges and Local Roads

SR 14 Interchange

The function of this interchange would remain largely the same as it is currently. Direct connections between I-5 and SR 14 would be rebuilt. Access to and from downtown Vancouver would be provided as it is today, but the connection points would be relocated. Downtown Vancouver I-5 access to and from the south would be at C Street rather than Washington Street, while downtown connections to and from SR 14 would be made by way of Columbia Street at 4th Street.

The multi-use bicycle and pedestrian path in the northbound (eastern) I-5 bridge would exit the structure between the Columbia River and SR 14 interchange, and then loop down to connect into Columbia Way.

Mill Plain Interchange

This interchange would be reconfigured into a SPUI. The existing diamond configuration requires two traffic signals to move vehicles through the interchange. The SPUI would use one efficient intersection that allows opposing left turns simultaneously. This would improve the capacity of the interchange by reducing delay for traffic entering or exiting I-5.

This interchange would also receive several improvements for bicyclists and pedestrians. These include bike lanes and sidewalks, clear delineation and signing, short perpendicular crossings at the ramp terminals, and ramp orientations that would make pedestrians highly visible to on-coming motorists.

Fourth Plain Interchange

The improvements to this interchange would be made to better accommodate freight mobility and access to the new park-and-ride facility near Clark College. Northbound I-5 traffic exiting to Fourth Plain would continue to use the off-ramp just north of the SR 14 interchange. The southbound I-5 exit to Fourth Plain would be braided with the SR 500 connection to I-5. Braiding these ramps would eliminate the non-standard weave between the SR 500 connection and the off-ramp to Fourth Plain as well as the westbound SR 500 to Fourth Plain Boulevard connection.

Additionally, several improvements would be made to provide better bicycle and pedestrian mobility and accessibility, including bike lanes, neighborhood connections, and access to the park-and-ride facility.

SR 500 Interchange

Improvements would be made to the SR 500 interchange to add direct connections to and from I-5 in place of some existing connections to and from 39th Street. On- and off-ramps would be built to directly connect SR 500 and I-5 to and from the north, connections that are currently made by way of 39th Street. I-5 southbound traffic would connect to eastbound SR 500 via a new tunnel underneath I-5. SR 500 eastbound traffic would connect to I-5 northbound on a new on-ramp. The 39th Street connections with I-5 to and from the north would be eliminated. I-5 travelers would instead use Main Street to connect to and from 39th Street.

Additionally, several improvements would be made to provide better bicycle and pedestrian mobility and accessibility, including sidewalks on both sides of 39th Street, bike lanes, and neighborhood connections.

***Potential phased construction option*:** The northern half of the existing SR 500 interchange would be retained, rather than building new connections between I-5 southbound to SR 500 eastbound and from SR 500 westbound to I-5 northbound. The ramps connecting SR 500 and I-5 to and from the north could be constructed separately in the future as funding becomes available.

Downtown Vancouver Light Rail Alignment, Stations, and Park and Ride Lots

After crossing the Columbia River, the light rail alignment would curve slightly west from the highway bridge and onto its own smaller structure over the BNSF rail line. The double-track guideway would descend on structure and touch down on Washington Street south of 5th Street, continuing north on Washington Street to 7th Street. The elevation of 5th Street would be raised to allow for an at-grade crossing of the tracks on Washington Street. Between 5th and 7th Streets, the double-track guideway would run down the center of the street. Traffic would not be allowed on Washington between 5th and 6th Streets and would be two-way between 6th and 7th Streets. There would be a station on each side of the street on Washington between 5th and 6th Streets.

At 7th Street, the light rail alignment would form a couplet. The single-track northbound guideway would turn east for two blocks, then turn north onto Broadway Street, while the single-track southbound guideway would continue on Washington Street. Seventh Street would be converted to one-way traffic eastbound between Washington and Broadway with light rail operating on the north side of 7th Street. This couplet would extend north to 17th Street, where the two guideways would join and turn east.

The light rail guideway would run on the east side of Washington Street and the west side of Broadway Street, with one-way traffic southbound on Washington Street and one-way traffic northbound on Broadway Street. On station blocks, the station platform would be on the side of the street at the sidewalk. There would be two stations on the Washington-Broadway couplet, one pair of platforms near Evergreen Boulevard, and one pair near 15th Street.

The single-track southbound guideway would run in the center of 17th Street between Washington and Broadway Streets. At Broadway Street, the northbound and southbound alignments of the couplet would become a double-track center-running guideway traveling east-west on 17th Street. The guideway on 17th Street would run until G Street, then connect with McLoughlin Boulevard and cross under I-5. Both alignments would end at a station east of I-5 on the western boundary of Clark College.

Three park-and-ride lots would be built in Vancouver along the light rail alignment:

- Within the block surrounded by Columbia, Washington, 4th and 5th Streets, with five floors above ground that include space for retail on the first floor and 570 parking stalls.
- Between Broadway and Main Streets next to the stations between 15th and 16th Streets, with space for retail on the first floor, and four floors above ground that include 420 parking stalls.
- At Clark College, just north of the terminus station, with space for retail or C-TRAN services on the first floor, and five floors that include approximately 1,910 parking stalls.

The park and ride lots would accommodate transit users driving to the lot, parking and then transferring to transit, as well as those being dropped off by others (quick drop). Peak hour vehicle-trip generation for each of these lots is a combination of park and ride trips (entered during the morning peak and departed during the afternoon/evening peak) and quick drop trips (entering and exiting during each peak). **Exhibit 7-29** summarizes the estimated vehicle-trip generation for each lot, excluding feeder and local buses serving the lots, and is differentiated by park and ride trips (parking trips) and quick drop trips (drop-off and pick-up trips). As shown in **Exhibit 7-29**, Columbia would generate an estimated 310 morning and 280 afternoon/evening peak trips; Mill Plain would generate an estimated 225 morning and 205 afternoon/evening peak trips; and Clark would generate an estimated 1,050 morning and 955 afternoon/evening peak hour trips

7.3.2.2 SR 14/City Center Interchange Area Operational Performance

Under the LPA and LPA with highway phasing, the SR 14/City Center interchange area consists of 39 study intersections as shown in **Exhibit 7-30**, of which five would be new intersections that do not exist under No-Build conditions. New or revised intersections are labeled with two letters instead of numbers to help with the identification. Two of the intersections that exist under No-Build conditions would be eliminated. The five new intersections would be at the following locations:

- Main Street at Columbia Way
- Main Street at SR 14 Eastbound
- Main Street at surface lot
- Main Street at 5th Street
- 5th Street at Columbia Park and Ride

The intersections of Washington at 4th Street and Columbia Street at 4th Street would be eliminated under the LPA and LPA with highway phasing.

With the planned highway improvements, access to and from downtown Vancouver would be provided as it is today, but the connection points would be relocated. Access to I-5 southbound from downtown Vancouver would be from C Street rather than Washington Street, while access to SR 14 would be made by way of Columbia Street at 3rd/4th Street and Main Street at 3rd/4th Street. Access from SR 14 would be made via Washington Street and Columbia Street.

Based on WSDOT and City of Vancouver staff recommendations, four new roundabouts would also be built within the SR 14 interchange area. These roundabouts would be at the following locations:

- Main Street at Columbia Way
- Columbia Street at Columbia Way
- Main Street at SR 14 Eastbound
- Columbia Street at SR 14 Westbound and 3rd/4th Street

Traffic circulation within the downtown area would also be modified compared to the No-Build Alternative. Washington Street would remain one-way southbound with light rail transit running on the east side of the street, while Broadway Street would be converted from two-way traffic to one-way northbound with light rail transit running on the west side of the street. C Street would also be converted from one-way northbound to two-way north-south traffic.

As shown in **Exhibit 7-31**, during the morning peak, all 39 of the study intersections would operate acceptably with improved, similar, or slightly degraded conditions compared to No-Build conditions.

As shown in **Exhibit 7-32**, during the afternoon/evening peak, all 39 of the study intersections would operate acceptably with improved, similar, or slightly degraded conditions compared to No-Build conditions.

As shown in **Exhibit 7-31**, during the morning peak, 33 of the study intersections would operate with acceptable vehicle queuing. Based on 95% queuing analysis, six of the study intersections would experience queuing extending past turn lane storage capacities or to upstream intersections, which would not result under the No-Build Alternative.

As shown in **Exhibit 7-32**, during the afternoon/evening peak, 29 intersections would operate with acceptable vehicle queuing. Based on 95% queuing analysis, 10 of the study intersections would experience queuing extending past turn lane storage capacities or to upstream intersections, which would not result under the No-Build Alternative.

Recommended Mitigation Measures

As all intersections would operate acceptably under the LPA and LPA with highway phasing, no traffic mitigation would be required.

7.3.2.3 Mill Plain Boulevard Interchange Area Operational Performance

The Mill Plain Boulevard interchange area consists of 29 study intersections as shown in **Exhibit 7-33**. New or revised intersections are labeled with two letters instead of numbers to help with the identification. Of the 29 study intersections, four would be new intersections that were not modeled under No-Build conditions and one would be removed by converting the I-5 northbound and southbound ramp terminals into one single point urban interchange (the existing “diamond” configuration requires two traffic signals to move vehicles through the interchange while the SPUI uses one intersection and allows opposing left turns simultaneously). The new intersections would be near the Mill District and Clark College park-and-ride lots at the following locations:

- Mill District park and ride at 15th Street
- Mill District park and ride at 16th Street
- Clark College park and ride at McLoughlin Boulevard
- Marshal Center East Access at McLoughlin Boulevard

As shown in **Exhibit 7-31**, during the morning peak, all 29 of the study intersections would operate acceptably with improved, similar, or slightly degraded conditions compared to No-Build conditions.

As shown in **Exhibit 7-32**, during the afternoon/evening peak, 27 of the study intersections would operate acceptably with improved, similar, or slightly degraded conditions. Two intersections would have unacceptable operations under the LPA and LPA with highway phasing. The intersections with unacceptable operations would be:

- Mill Plain Boulevard at C Street
- 15th Street at C Street

As shown in **Exhibit 7-31**, during the morning peak, 18 of the study intersections would operate with acceptable vehicle queuing. Based on 95% queuing analysis, 11 of the study intersections would experience queuing extending past turn lane storage capacities or to upstream intersections, which would not result under the No-Build Alternative.

As shown in **Exhibit 7-32**, during the afternoon/evening peak, 18 of the study intersections would operate with acceptable vehicle queuing. Based on 95% queuing analysis, 11 of the study intersections would experience queuing extending past turn lane storage capacities or to upstream intersections, which would not result under the No-Build Alternative.

Recommended Mitigation Measures

City of Vancouver and/or WSDOT, as appropriate, would monitor traffic operations and pursue the following mitigation measures recommended under the LPA:

- Add a third lane westbound on 15th Street between Washington Street and Columbia Street. Adding the third through lane will allow the drop lane at 15th Street and Washington Street to become a left/through lane adding additional capacity to the 15th Street corridor. This should be completed at such a time as it is necessary to achieve the operational standards along the 15th Street corridor.
- Add a southbound right turn lane at 15th Street and Columbia Street. This should be completed at such time as it is necessary to achieve the operational standards at the intersection of 15th Street and Columbia Street.
- Add a third eastbound left turn at the Mill Plain interchange when needed in the future. The third eastbound left turn lane should be added when eastbound left-turn volumes have increased to a level that cause the interchange to fail to meet acceptable operational standards.
- Monitor and adjust ramp meter rates at Mill Plain Boulevard on-ramps, if/when these are installed in the future. When queuing from the ramp causes either ramp terminal to fail to meet the operational standard, ramp meter rates should be adjusted. Due consideration, but not equal weight, will be given to the local system to minimize queuing from the ramp meter. Emphasis will be on avoiding significant adverse impacts and traffic operational failures on the freeway system.

7.3.2.4 Fourth Plain Boulevard Interchange Area Operational Performance

The Fourth Plain Boulevard interchange area, as shown in **Exhibit 7-34**, consists of 14 study intersections, all of which exist currently. The proposed LPA and LPA with highway phasing interchange configuration would allow traffic exiting the Clark park-and-ride facility to merge with traffic exiting I-5 going to Fourth Plain Boulevard. Traffic entering the park-and-ride facility will cross under traffic exiting I-5 and the park-and-ride facility.

As shown in **Exhibit 7-31**, during the morning peak, 13 of the study intersections would operate acceptably with improved, similar, or slightly degraded conditions as compared to the No-Build Alternative. The unsignalized intersection of 29th Street at Main Street would degrade from acceptable operations under the No-Build Alternative to unacceptable operations under the LPA and LPA with highway phasing.

As shown in **Exhibit 7-32**, during the afternoon/evening peak, all 14 of the study intersections with the LPA would operate acceptably with improved, similar, or slightly degraded conditions as compared to the No-Build Alternative. With the LPA with highway phasing configuration, the intersection of 33rd Street at Main Street would degrade from acceptable operations under the No-Build Alternative to unacceptable operations. This is caused by downstream congestion at the intersection of 39th Street and Main Street.

As shown in **Exhibit 7-31**, during the morning peak, 11 of the study intersections would operate with acceptable vehicle queuing. Based on 95% queuing analysis, three of the study intersections would experience queuing extending past turn lane storage capacities or to upstream intersections, which would not result under the No-Build Alternative.

As shown in **Exhibit 7-32**, during the afternoon/evening peak, 13 of the study intersections would operate with acceptable vehicle queuing with the LPA. Based on 95% queuing analysis, the intersection of Fourth Plain Boulevard at Broadway would experience queuing extending past turn lane storage capacities or to upstream intersections, which would not result under the No-Build Alternative. With the LPA with highway phasing configuration, the additional intersection of 33rd Street at Main Street would experience queuing extending past turn lane storage capacities or to upstream intersections, which would not result under the No-Build Alternative.

Recommended Mitigation Measures

City of Vancouver and/or WSDOT, as appropriate, would monitor traffic operations and pursue the following mitigation measures recommended under the LPA:

- Monitor and adjust ramp meter rates at Fourth Plain Boulevard ramps, if/when these are installed in the future. When queuing from the ramp causes either ramp terminal to fail to meet the operational standard, ramp meter rates should be adjusted. Due consideration, but not equal weight, will be given to the local system to minimize queuing from the ramp meter. Emphasis will be on avoiding significant adverse impacts and traffic operational failures on the freeway system.

7.3.2.5 SR 500/Main Street/39th Street Interchange Area Operational Performance

The SR 500/Main Street/39th Street interchange area, as shown in **Exhibit 7-35**, consists of 10 study intersections, all of which currently exist.

As shown in **Exhibit 7-31**, during the morning peak, with the LPA all 10 of the study intersections would operate acceptably with improved, similar, or slightly degraded conditions as compared to the No-Build Alternative. With the LPA with highway phasing nine of the study intersections would operate acceptably with improved, similar, or slightly degraded conditions. The intersection of 39th Street at H Street would degrade from acceptable or unacceptable operations under the No-Build Alternative to unacceptable operations under the LPA with highway phasing.

As shown in **Exhibit 7-32**, during the afternoon/evening peak, with the LPA nine of the study intersections would operate acceptably with improved, similar, or slightly degraded conditions. The intersection of 39th Street at I-5 Southbound would degrade from acceptable or unacceptable operations under the No-Build Alternative to unacceptable operations under the LPA. With the LPA with highway phasing, the additional intersections of 39th Street at H Street and 40th Street at Main Street would degrade from acceptable or unacceptable operations under the No-Build Alternative to unacceptable operations under the LPA with highway phasing.

As shown in **Exhibit 7-31**, during the morning peak, with the LPA eight study intersections would operate with acceptable vehicle queuing while two of the study intersections, based on 95% queuing analysis, would experience queuing extending past turn lane storage capacities or to upstream intersections, which would not result under the No-Build Alternative. With the LPA with highway phasing, six of the study intersections would operate with acceptable vehicle queuing while four of the study intersections, based on 95% queuing analysis, would experience queuing extending past turn lane storage capacities or to upstream intersections, which would not result under the No-Build Alternative.

As shown in **Exhibit 7-32**, during the afternoon/evening peak, with the LPA nine study intersections would operate with acceptable vehicle queuing while one of the study intersections, based on 95% queuing analysis, would experience queuing extending past turn lane storage capacities or to upstream intersections, which would not result under the No-Build Alternative. With the LPA with highway phasing, seven of the study intersections would operate with acceptable vehicle queuing while three of the study intersections, based on 95% queuing analysis, would experience queuing extending past turn lane storage capacities or to upstream intersections, which would not result under the No-Build Alternative.

Recommended Mitigation Measures

No traffic mitigation is required in the SR 500/Main Street/39th Street Interchange Area. The intersection of 39th Street at Main Street is overcapacity and operates unacceptably in the No-Build Alternative. There is significant background growth forecast for this area of Vancouver.

7.3.2.6 Portland Service Levels – Morning/Afternoon Peak Hour

The LPA includes improvements to the three interchanges along I-5 in Portland including Hayden Island, Marine Drive, and Victory Boulevard. These improvements include some reconfiguration of adjacent local streets to complement the new interchange designs, as well as new facilities for bicyclists and pedestrians within and along this corridor.

Interchanges and Local Roads

Hayden Island Interchange

This interchange would be completely reconfigured with replacement of the existing, obsolete, gull-wing style interchange. The new configuration would be a split, tight diamond interchange. Ramps parallel to the highway would be built, lengthening the ramps and improving merging speeds. Improvements to Jantzen Drive and Hayden Island Drive would include additional through, left-turn, and right-turn lanes. A new local road, Tomahawk Island Drive, would travel east-west through the middle of Hayden Island and under the I-5 interchange, improving connectivity across I-5 on the island. Additionally, a new multi-use path would be provided along the elevated light rail line on the west side of the Hayden Island interchange.

LPA Option A: A proposed arterial bridge with two lanes of traffic, one in each direction, would allow vehicles to travel between Martin Luther King Jr. Boulevard/ Marine Drive and Hayden Island without accessing I-5.

LPA Option B: With this design option there would be no arterial traffic lanes on the light rail/multi-use path bridge over North Portland Harbor. Instead, vehicles traveling between Martin Luther King Jr. Boulevard/Marine Drive and Hayden Island would travel on the collector-distributor bridges that parallel each side of I-5 over North Portland Harbor.

Marine Drive Interchange

This interchange would be reconfigured to reduce congestion for motorists entering and exiting I-5 at this location. The new interchange configuration would be a single-point urban interchange (SPUI) with a flyover ramp serving the east to north movement. With this configuration, three legs of the interchange would converge at a point on Marine Drive, over the I-5 mainline.

The Marine Drive eastbound to I-5 northbound flyover ramp would allow motorists, including high volume of trucks, to access I-5 northbound without stopping. Motorists from Marine Drive eastbound would also access I-5 southbound without stopping. Motorists traveling on Martin Luther King Jr. Boulevard westbound to I-5 northbound would access I-5 without stopping.

The new interchange configuration alters the road connections on the east side of I-5 and makes Martin Luther King Jr. Boulevard the principal access from the east side of I-5 to the interchange and provides a new direct connection to I-5 northbound.

In the new interchange configuration, Vancouver Way and Marine Drive traffic would be served via Martin Luther King Jr. Boulevard using improved connections further east of the reconfigured interchange. The new connection from Vancouver Way to Martin Luther King Jr. Boulevard would allow traffic to turn right from Vancouver Way and accelerate onto Martin Luther King Jr. Boulevard for easy access to northbound I-5 or the new SPUI. On the south side of Martin Luther King Jr. Boulevard, the existing loop connection would be replaced with a new connection farther east.

A new multi-use path for bicyclists and pedestrians would extend from the Bridgeton neighborhood to the existing Expo Center light rail station, and then from that station to Hayden Island. The path would be on the new bridge that also accommodates the new light rail line over North Portland Harbor.

LPA Option A: Local traffic between Martin Luther King Jr. Boulevard/Marine Drive and Hayden Island would travel via an arterial bridge over North Portland Harbor. There would be some variation in the alignment of local streets in the area of the interchange between Option A and Option B. The most prominent differences are the alignments of Vancouver Way and Union Court.

LPA Option B: With this design option, there would be no arterial traffic lanes on the light rail/multi-use path bridge over North Portland Harbor. Instead, vehicles traveling between Martin Luther King Jr. Boulevard/ Marine Drive and Hayden Island would travel on the collector-distributor bridges that would parallel each side of I-5 over North Portland Harbor. Traffic would not need to merge onto mainline I-5 to travel between the island and Martin Luther King Jr. Boulevard/Marine Drive.

***Potential phased construction option*:** The aforementioned flyover ramp could be deferred and not constructed as part of the CRC project. In this case, rather than providing a direct eastbound Marine Drive to I-5 northbound connection by a flyover ramp, the project improvements to the interchange would instead provide this connection through the signal-controlled SPUI. The flyover ramp could be constructed separately in the future as funding becomes available.

Victory Boulevard Interchange

The southern extent of the I-5 project improvements would be two ramps associated with the Victory Boulevard interchange in Portland. The Marine Drive to I-5 southbound on-ramp would be braided over the I-5 southbound to the Victory Boulevard/Denver Avenue off-ramp. The other ramp improvement would lengthen the merge distance for northbound traffic entering I-5 from Denver Avenue. The current merging ramp would be extended to become an add/drop (auxiliary) lane that would continue across the river crossing.

***Potential phased construction option*:** The aforementioned southbound ramp improvements to the Victory Boulevard interchange may not be included with the CRC project. Instead, the existing connections between I-5 southbound and Victory Boulevard could be retained. The braided ramp connection could be constructed separately in the future as funding becomes available.

Oregon Light Rail Alignment and Station

A two-way light rail alignment for northbound and southbound trains would be constructed to extend from the existing Expo Center MAX station over North Portland Harbor to Hayden Island. Immediately north of the Expo Center, the alignment would curve eastward toward I-5, pass beneath Marine Drive, and then rise over a flood wall onto a light rail/multi-use path bridge to cross North Portland Harbor. The double-track guideway over Hayden Island would be elevated at approximately the height of the rebuilt mainline of I-5, as would a new station immediately west of I-5. The alignment would extend northward on Hayden Island along the western edge of I-5, until it transitions into the hollow support structure of the new western bridge over the Columbia River.

7.3.2.7 Hayden Island Interchange Area Operational Performance

Under the LPA and LPA with highway phasing both Option A and Option B, the Hayden Island interchange area consists of 11 study intersections as shown in **Exhibit 7-36**. New intersections are labeled with two letters instead of numbers to help with the identification. Four of the new study intersections would replace the existing two ramp terminal intersections analyzed under existing and No-Build conditions. The remaining seven study intersections are used to analyze local street traffic.

As shown in **Exhibit 7-37**, during the morning peak for Option A and Option B, all four of the proposed ramp intersections and all seven of the local street intersections would operate acceptably as compared to the applicable standards. As shown in **Exhibit 7-38**, during the afternoon/evening peak for Option A and Option B, all 11 intersections would also operate acceptably. During the morning and afternoon/evening peak hours, based on 95% queuing analysis, all of the study intersections would operate with acceptable vehicle queuing.

Recommended Mitigation Measures

As all intersections would operate acceptably under the LPA and LPA with highway phasing for both Options A and B, no traffic mitigation would be required.

7.3.2.8 Marine Drive Interchange Area Operational Performance

Under the LPA Option A and Option A with highway phasing, the Marine Drive interchange area including Bridgeton would consist of seven study intersections as shown in **Exhibit 7-39**. Under the LPA Option B and Option B with highway phasing, the Marine Drive interchange area including Bridgeton would consist of six study intersections as shown in **Exhibit 7-39.** The difference between Option A and Option B is that Option A has an additional intersection at the location of the arterial bridge and Little Marine Drive. New or revised intersections are labeled with two letters instead of numbers to help with the identification.

As shown in **Exhibit 7-37** and **Exhibit 7-38**, all of the proposed intersections during the morning and afternoon/evening peaks would operate acceptably under the LPA and LPA with highway phasing for both Options A and B as compared to the applicable standards.

As shown in **Exhibit 7-37** and **Exhibit 7-38**, based on 95% queuing analysis, all intersections during the morning and afternoon/evening peaks would operate with acceptable vehicle queuing under the LPA and LPA with highway phasing for both Options A and B.

Recommended Mitigation Measures

As all intersections would operate acceptably under the LPA and LPA with highway phasing for both Options A and B, no traffic mitigation would be required.

7.3.2.9 Victory Boulevard Interchange Area Operational Performance

Under the LPA and LPA with highway phasing, the Victory Boulevard interchange area would remain in the same configuration as the No-Build Alternative. The interchange area consists of four study intersections as shown in **Exhibit 7-40**.

As shown in **Exhibit 7-37 and Exhibit 7-38**, during the morning and afternoon/evening peaks, all four of the study intersections would operate acceptably under the LPA and LPA with highway phasing with similar conditions as compared to the No-Build Alternative. Based on 95% queuing analysis, all of the proposed study intersections would operate with acceptable vehicle queuing under the LPA and LPA with highway phasing when compared to the No-Build Alternative.

Recommended Mitigation Measures

As all intersections would operate acceptably under the LPA and LPA with highway phasing, no traffic mitigation would be required.

7.3.2.10 Interstate Avenue Analysis Area Operational Performance

Under the LPA and LPA with highway phasing, the Interstate Avenue analysis area would remain the same as the No-Build Alternative. The analysis area consists of four study intersections as shown in **Exhibit 7-41**.

As shown in **Exhibit 7-37**, during the morning peak, three of the study intersections would operate acceptably with improved, similar, or slightly degraded conditions under the LPA and LPA with highway phasing compared to No-Build conditions. One would degrade from acceptable or unacceptable operations under the No-Build Alternative to unacceptable operations under the LPA and LPA with highway phasing.

As shown in **Exhibit 7-38**, during the afternoon/evening peak, all four of the study intersections would operate acceptably under the LPA and LPA with highway phasing with similar conditions as compared to the No-Build Alternative.

As shown in **Exhibit 7-37**, during the morning peak, based on 95% queuing analysis, all of the study intersections would operate with acceptable vehicle queuing under the LPA and LPA with highway phasing. As shown in **Exhibit 7-38**, during the afternoon/evening peak, two of the study intersections in the LPA and LPA with highway phasing would operate with acceptable vehicle queuing. Based on 95% queuing analysis, two intersections in the LPA and LPA with highway phasing would experience queuing extending past turn lane storage capacities or to upstream intersections, which would not result under the No-Build Alternative.

Recommended Mitigation Measures

The following measures are recommended to mitigate unacceptable operations under the LPA and LPA with highway phasing:

Going Street and Interstate Avenue:

- Optimize light rail transit pre-emption at intersection.
- Install advanced signal controllers to manage light rail transit pre-emption.
- Change westbound right into a through/right choice lane to allow traffic to continue westbound.

7.3.2.11 Martin Luther King Jr. Boulevard Analysis Area Operational Performance

Under the LPA and LPA with highway phasing, the Martin Luther King Jr. Boulevard analysis area would remain the same as the No-Build Alternative. The analysis area consists of five study intersections as shown in **Exhibit 7-41**.

As shown in **Exhibit 7-37 and Exhibit 7-38**, during the morning and afternoon/evening peaks, all five of the study intersections would operate acceptably under the LPA and LPA with highway phasing with improved, similar, or slightly degraded conditions. Based on 95% queuing analysis, all five of the study intersections would operate with acceptable vehicle queuing under the LPA and LPA with highway phasing when compared to the No-Build Alternative.

Recommended Mitigation Measures

As all intersections would operate acceptably under the LPA and LPA with highway phasing, no traffic mitigation would be required.

7.3.2.12 I-5 Ramp Terminals Analysis Area Operational Performance

Under the LPA and LPA with highway phasing, the I-5 Ramp Terminals analysis area would remain in the same configuration as the No-Build Alternative. The interchange area consists of seven study intersections as shown in **Exhibit 7-41**.

As shown in **Exhibit 7-37 and Exhibit 7-38**, during morning and afternoon/evening peaks, all of the study intersections would operate acceptably under the LPA and LPA with highway phasing with improved, similar, or slightly degraded conditions. All seven of the study intersections would operate with acceptable vehicle queuing under the LPA and LPA with highway phasing when compared to the No-Build Alternative, with the exception of Rosa Parks Way and the I-5 northbound on-/off-ramps intersection during the afternoon/evening peak hour. Based on 95% queuing analysis, this intersection would experience queuing extending past turn lane storage capacities or to upstream intersections, which would not result under the No-Build Alternative.

Recommended Mitigation Measures

As all intersections would operate acceptably under the LPA and LPA with highway phasing, no traffic mitigation would be required.

7.4 Pedestrian and Bicycle Circulation

7.4.1 Pedestrian and Bicycle Improvements

Substantial bicycle and pedestrian improvements are included in the LPA. These include new facilities such as the multi-use pathway across the river, street improvements around the rebuilt interchanges, and new facilities for bicyclists and pedestrians around the new light rail stations and park and rides. The proposed improvements are described below from the south end of the project to the north end.

7.4.1.1 Marine Drive and North Portland

The proposed configuration of the Marine Drive interchange would be entirely grade separated with a local road network and multi-use paths below. Pedestrian and bicycle improvements at the Marine Drive interchange would include a multi-use path constructed from the Marine Drive interchange to Southeast Columbia Way in downtown Vancouver. The path would be a minimum of 16 feet wide between its barriers and would direct users with pavement markings. Larger curves would provide improved sight distance and flow, and path components will meet ADA accessibility standards.

The multi-use path in North Portland would begin along Union Court at Delta Park heading west. The path will cross below Martin Luther King Jr. Boulevard at the existing Marine Way location. Marine Way would be removed along with the loop ramps connecting to Martin Luther King Jr. Boulevard in this area. After crossing below Martin Luther King Jr. Boulevard, the multi-use path would split to the east and west. To the east, the multi-use path would connect to the intersection of Marine Drive and Vancouver Way. To the west, the multi-use path would travel along the north side of the new local road extension of North Marine Drive and cross below I-5 to eliminate pedestrian and bicycle traffic through the Marine Drive interchange. There would be the opportunity for the proposed Bridgeton Trail to connect to the multi-use path at several points along the new local road extension once another jurisdiction builds the Bridgeton Trail.

Sidewalks would be constructed along the southern side of the new local road extension with crosswalks provided at the intersection of Vancouver Way, Anchor Way, and Expo Road. All elements will meet ADA accessibility standards.

After crossing below I-5, the multi-use path would travel west to an at-grade crossing of the light rail tracks and connect to the existing west leg of the 40-Mile Loop trail along the North Portland Harbor and to a new pathway to Hayden Island. An auxiliary path would connect to the Expo Center light rail station. The pathway to Hayden Island would be 16 feet wide and will be on the same structure as the light rail transit guideway over North Portland Harbor.

7.4.1.2 Hayden Island

From North Portland Harbor, the new multi-use path would continue on the same structure as the new light rail transit alignment located parallel to and west of I-5. This elevated path would connect the North Portland Harbor bridge and the Columbia River bridge. Pedestrians and bicyclists could access the multi-use path at the North Hayden Island Drive ramp, the stairs, ramp or elevator at Tomahawk Island Drive light rail transit station, or the stairs at Jantzen Beach Drive.

To improve east-west connections on Hayden Island, 8-foot wide curb separated sidewalks would be provided along Jantzen Drive, Hayden Island Drive, and Tomahawk Island Drive. Crosswalks would be provided at all intersections and would meet ADA accessibility standards. The island streets would also include 6-foot bike lanes wherever improvements are made.

7.4.1.3 River Crossing

The new northbound highway bridge over the Columbia River would also accommodate a multi-use pathway under the highway deck. The multi-use path could be up to 24-feet wide, located within the superstructure above the bridge columns and below the bridge deck. The multi-use path would separate pedestrians and bicycle traffic through pavement markings. All bicycle and pedestrian improvements would meet ADA accessibility standards.

Current designs for the bridge superstructure include an open web box using a series of discrete diagonal members instead of solid walls on either side. This affords a partially open-sided, covered pathway for bicyclists and pedestrians rather than an enclosed tunnel.

Ramps would connect the multi-use path to Columbia Way and Columbia Street in Vancouver and to Hayden Island Drive on Hayden Island. Having the multi-use path beneath the highway deck would shorten connections because the pathway’s elevation would be lower than the roadway deck. Separating the multi-use path from the highway traffic would also reduce noise exposure to motor vehicles. The wide multi-use path would also reduce conflicts between bicyclists and pedestrians by affording enough space to accommodate two-way travel for both.

7.4.1.4 Downtown Vancouver

The multi-use path off the Columbia River Bridge would provide access to downtown Vancouver via a ramp to the intersection of Southeast Columbia Way and Columbia Street. A second access to the Vancouver waterfront would be by stairs or elevator off the bridge.

The multi-use path would provide connections to regional pedestrian and bikeway facilities that exist throughout Vancouver. These include the Waterfront Renaissance Trail on the north bank of the Columbia River that provides vehicle-separated access to the Confluence Land Bridge, Vancouver National Historic Reserve, and points farther east. The existing bike route along Columbia Street enables access through downtown

Vancouver and northwest along 15th Street towards Vancouver Lake. There are a number of east-west streets with bike lanes that cross I-5 providing access to the Burnt Bridge Creek Greenway Trail and to the larger system of regional trails in Clark County.

Sidewalks that are 12-feet wide would be provided along both sides of Washington Street and Broadway Street along the new light rail alignments, with ADA crosswalks at all intersections to East McLoughlin Boulevard.

7.4.1.5 Evergreen Boulevard and Community Connector

The existing I-5 overpass for Evergreen Boulevard would be rebuilt. The overpass would have bike lanes and 15-foot sidewalks with clear delineation and signing. The new pedestrian and bicycle facilities would connect to existing routes along these streets. All improvements would meet the ADA accessibility standards.

In addition, a new structure may be built to the south considerably wider than the current overpass (up to approximately 250 feet wide) and would include landscaping, pathways and other public space. It would provide an ADA accessible pedestrian and bicycle connection between downtown Vancouver and the Vancouver National Historic Reserve. In addition to improved pedestrian and bicycle connections, the facility would improve visual and cultural landscape connectivity. This new public space is proposed as part of the mitigation for the project's impacts to historic resources and aesthetic quality.

7.4.1.6 Mill Plain Interchange

The Mill Plain interchange would receive several improvements for bicyclists and pedestrians. These include bicycle lanes, 12-foot sidewalks, clear delineation and signing, short perpendicular crossings at the ramp terminals, ramp orientations that would encourage high pedestrian visibility, and new connections to F Street and to Marshall Park.

7.4.1.7 McLoughlin Boulevard

Bicycle lanes, 12-foot sidewalks, and crosswalks, all meeting ADA accessibility standards, would be constructed along the light rail alignment on McLoughlin Boulevard. Bicycle lanes from McLoughlin Boulevard would connect with bike lanes on Columbia Street to head south to the Columbia River.

7.4.1.8 Fourth Plain Interchange

The proposed interchange improvements would increase bicycle and pedestrian safety by adding east and west bound bicycle lanes with a 6-foot sidewalk on the south side. Near where the ramp to northbound I-5 connects with Fourth Plain and to the east of I-5, there would be a 14-foot wide multi-use path running north and south. North of Fourth Plain Boulevard, the pathway would provide biking and walking access to and from Rose Village and other adjacent neighborhoods. To the south, the pathway would cross Fourth Plain Boulevard and connect pedestrians and bicyclists to the proposed Clark College Park and Ride. Bike lockers would be provided for cyclists at the park and ride. Clearly marked ADA accessible crossings would be placed at each intersection approaching the park and ride.

7.4.1.9 29th Street and 33rd Street

New I-5 overpasses will be built for 29th Street and 33rd Street. Each overpass would have bicycle lanes and 6-foot minimum sidewalks with clear delineation and signing. The new pedestrian and bicycle facilities would connect to existing routes along these streets. All improvements will meet the ADA accessibility standards.

7.4.1.10 SR 500 Interchange

39th Street would have 6.5-foot sidewalks and 6-foot bicycle lanes on both the north and south side from H Street vicinity to 15th Avenue. Also, connections would be made to the existing neighborhood paths within the project limits.

***Potential phased construction option*:** These improvements are contingent on the decision to advance the highway improvements as described in **Section 2.1.2.2** for the SR 500 interchange.

7.4.2 Pedestrian and Bicycle Forecasts

A methodology for forecasting pedestrian and bicycle travel demands for an improved non-motorized facility across the Columbia River in the LPA was developed in part with input from the CRC's Pedestrian and Bicycle Advisory Committee. Forecasts took into account three primary factors related to pedestrian and bicycle demand: existing and future land uses, percentage of trips by mode, and walking and bicycling trip lengths.

During peak summer conditions in 2007, about 80 pedestrians and 370 bicyclists crossed the I-5 bridge daily. Many other pedestrians and bicyclists are discouraged from doing so because of the existing non-standard facilities on the bridge and connecting multi-modal infrastructure.

Future pedestrian and bicycle trips over the I-5 bridge were forecast using a variety of data, including mode share data from the US Census, information from local travel surveys, results from a bicycle trip study conducted by Portland State University, and travel characteristics associated with the Hawthorne Bridge, the most heavily traveled bridge by pedestrians and bicyclists in the region.

Average travel times by mode were converted into trip distances by mode, creating a matrix of pedestrian and bicycle mode shares by trip length. Future scenarios, shown in **Exhibit 7-42**, developed for sensitivity testing, considered the forecasted number of trips from the regional travel demand model and factored them by the respective pedestrian and bicycle mode share percentages.

The results of the forecasting scenarios, shown in **Exhibit 7-43**, reveal that pedestrian and bicycle travel demands would increase substantially for the I-5 bridge by 2030. Pedestrian travel across the bridge would be expected to increase from 80 pedestrians today to between 600 and 1,000 daily walkers, an increase of 650 to 1,150 percent over current conditions. The number of bicyclists predicted to use the crossing would increase from 370 today to between 900 and 6,400 riders, an increase of between 150 to over 1,625 percent. Generally, the I-5 bridge would be expected to serve about five bicyclists to every pedestrian, which is logical based on the length of the bridge and the location of developed and planned land uses.

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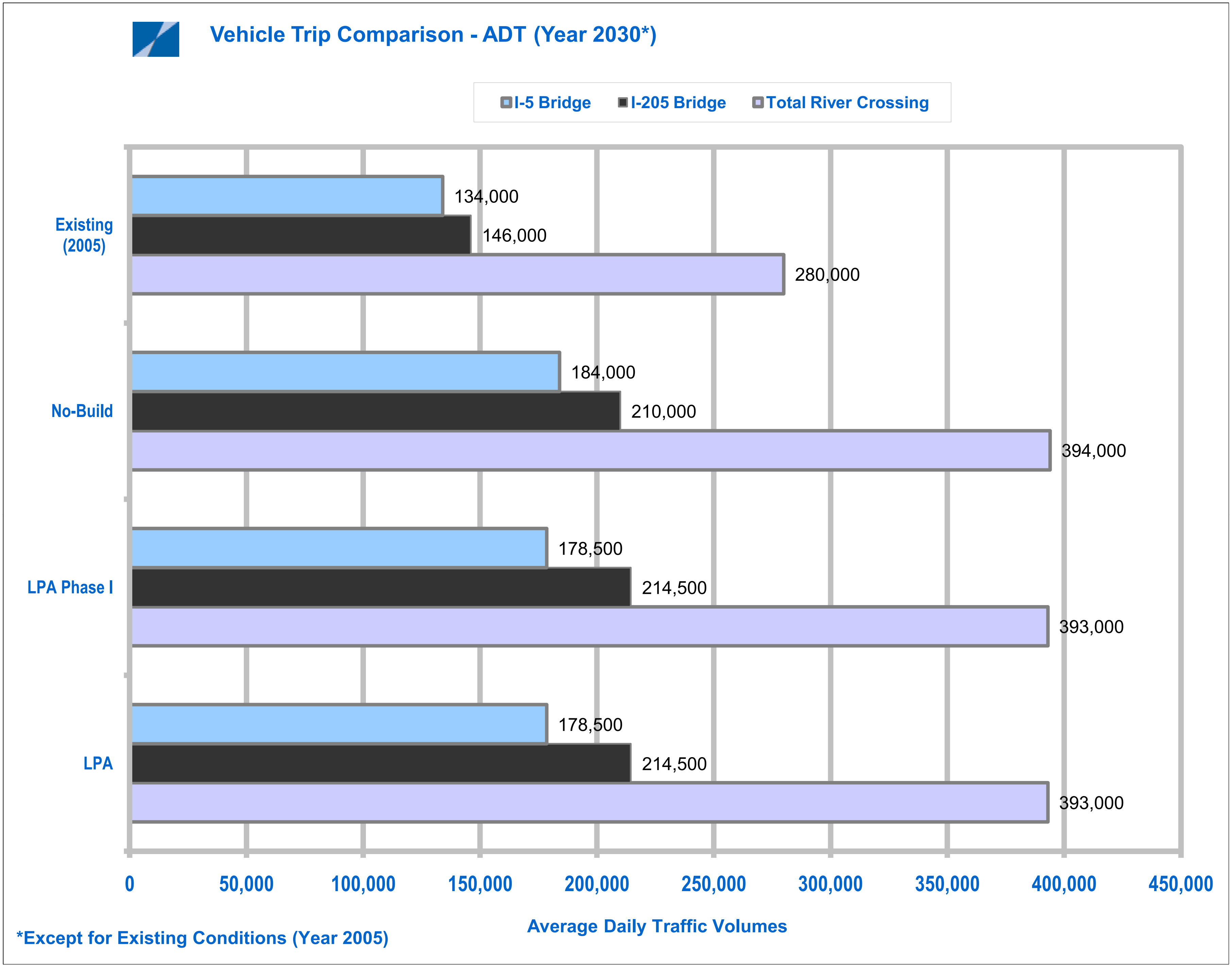
Exhibit 7-1



Vehicle Trip Comparison - ADT (Year 2030*)
I-5 Bridge
I-205 Bridge
Total River Crossing
Existing (2005)
No-Build
LPA Phase I
LPA
134,000
146,000
280,000
184,000
210,000
394,000
178,500
214,500
393,000
178,500
214,500
393,000
0
50,000
100,000
150,000
200,000
250,000
300,000
350,000
400,000
450,000
Average Daily Traffic Volumes
*Except for Existing Conditions (Year 2005)

Exhibit 7-2

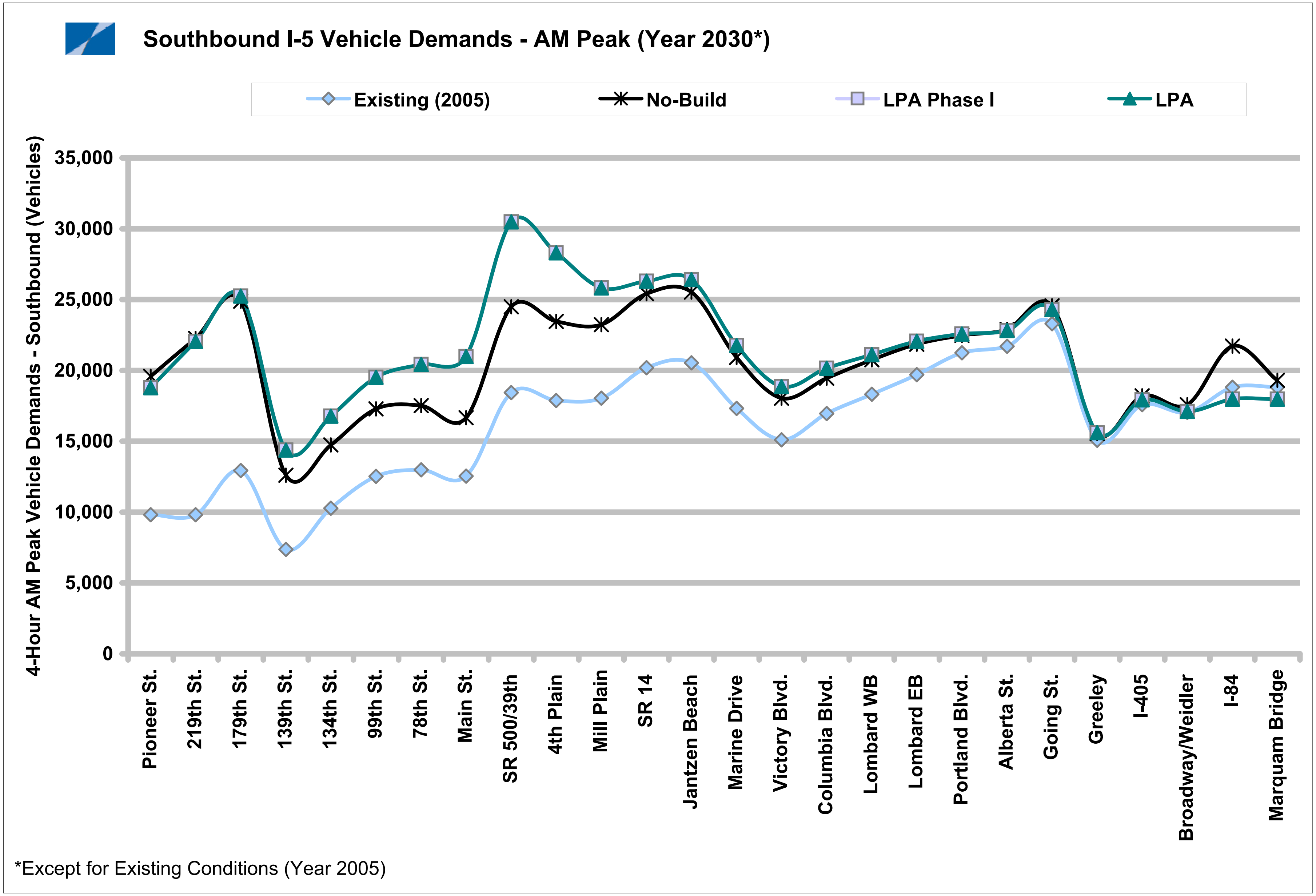
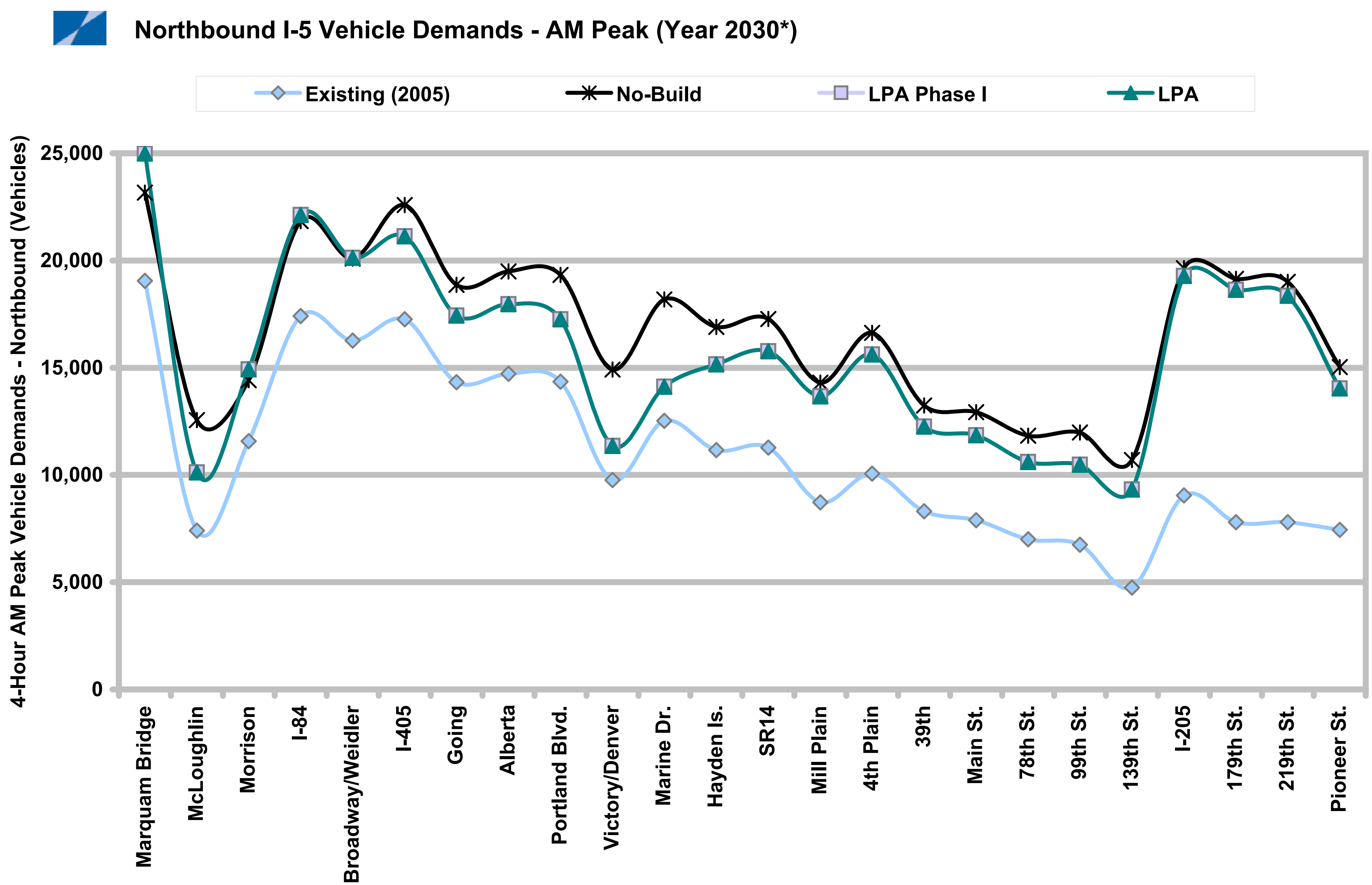
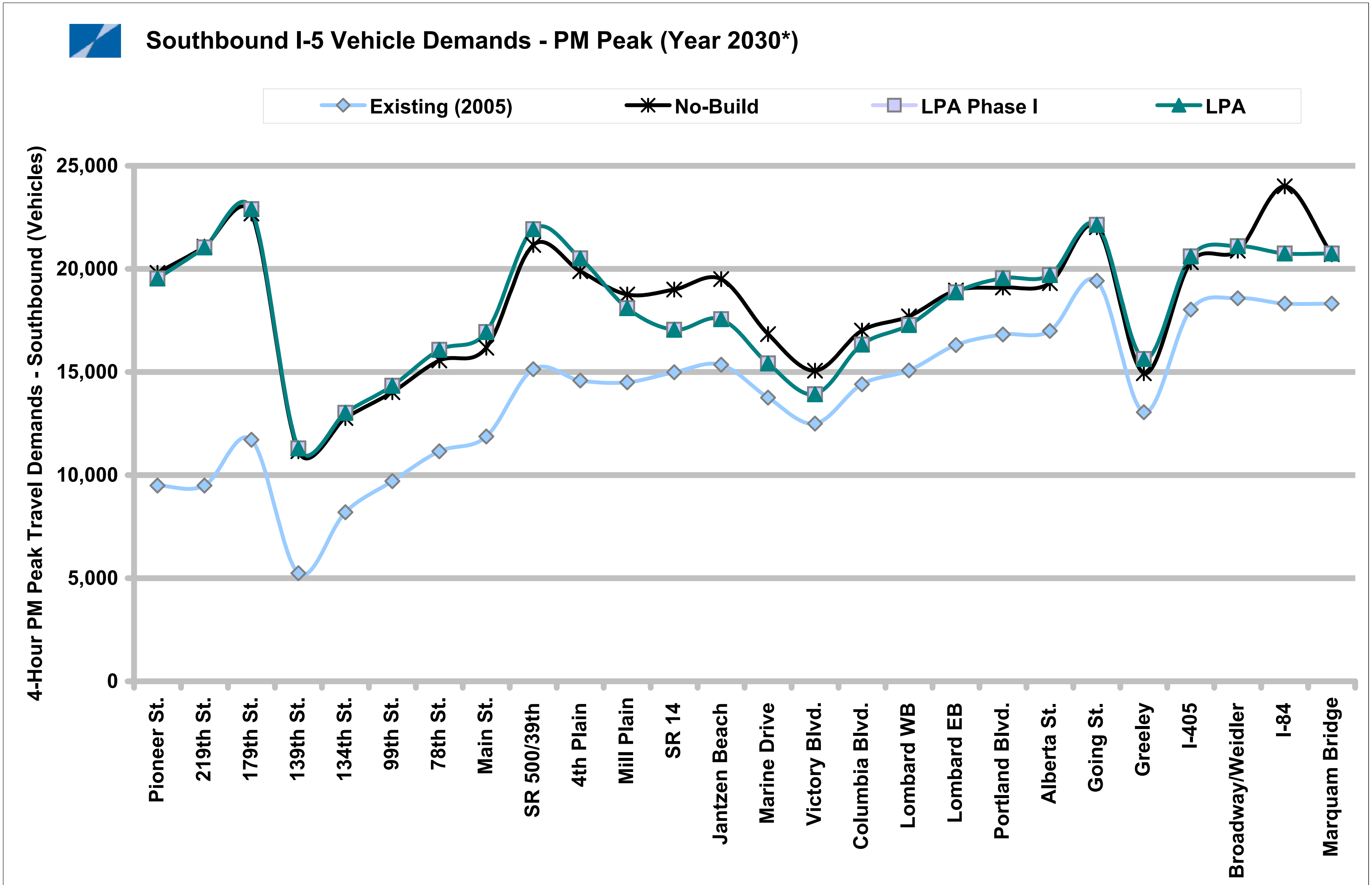

Southbound I-5 Vehicle Demands - AM Peak (Year 2030*)
Existing (2005)
No-Build
LPA Phase I
LPA
4-Hour AM Peak Vehicle Demands - Southbound (Vehicles)
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
Pioneer St.
219th St.
179th St.
139th St.
134th St.
99th St.
78th St.
Main St.
SR 500/39th
4th Plain
Mill Plain
SR 14
Jantzen Beach
Marine Drive
Victory Blvd.
Columbia Blvd.
Lombard WB
Lombard EB
Portland Blvd.
Alberta St.
Going St.
Greeley
I-405
Broadway/Weidler
I-84
Marquam Bridge
*Except for Existing Conditions (Year 2005)

Exhibit 7-3



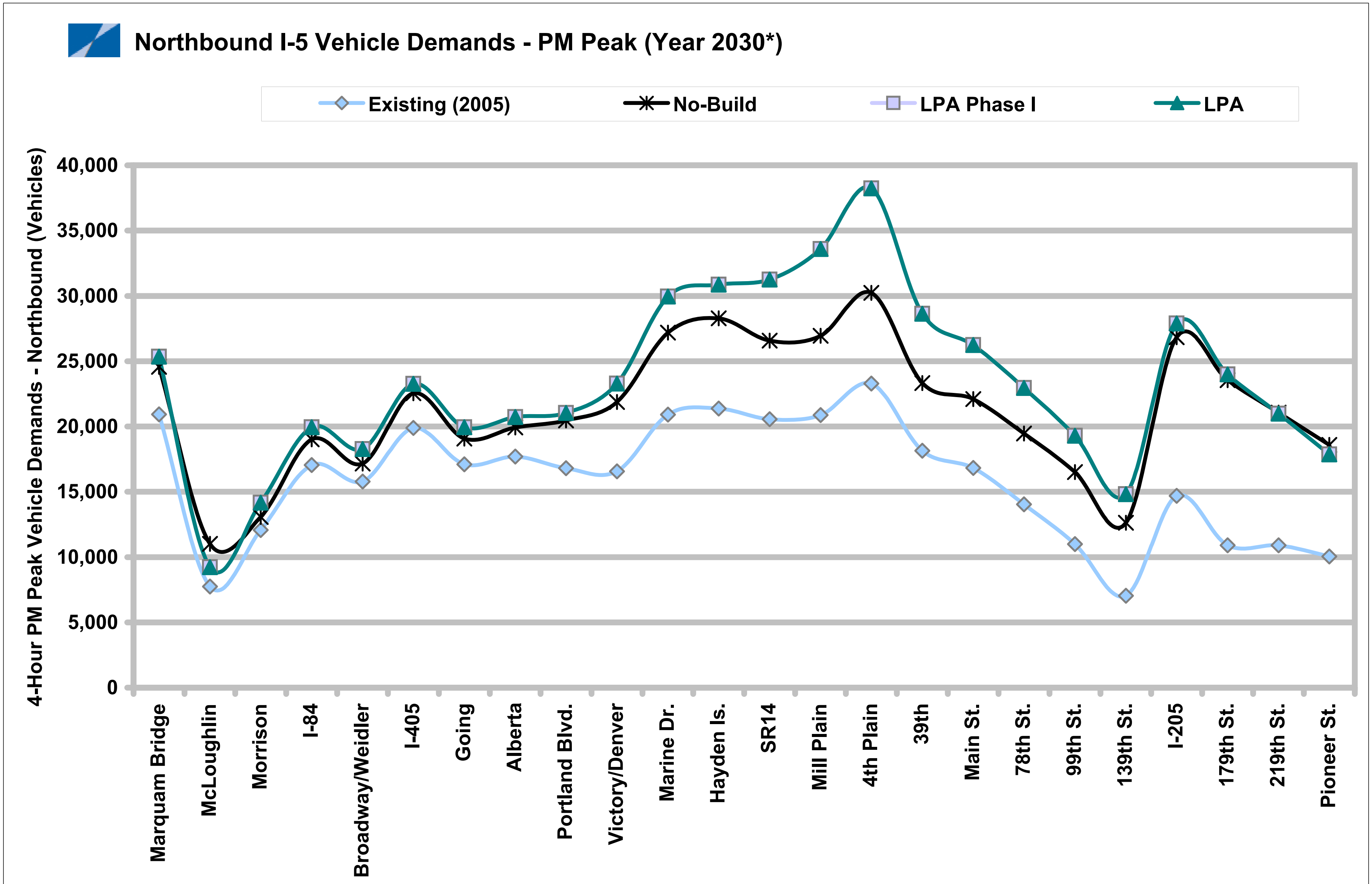
*Except for Existing Conditions (Year 2005)

Exhibit 7-4



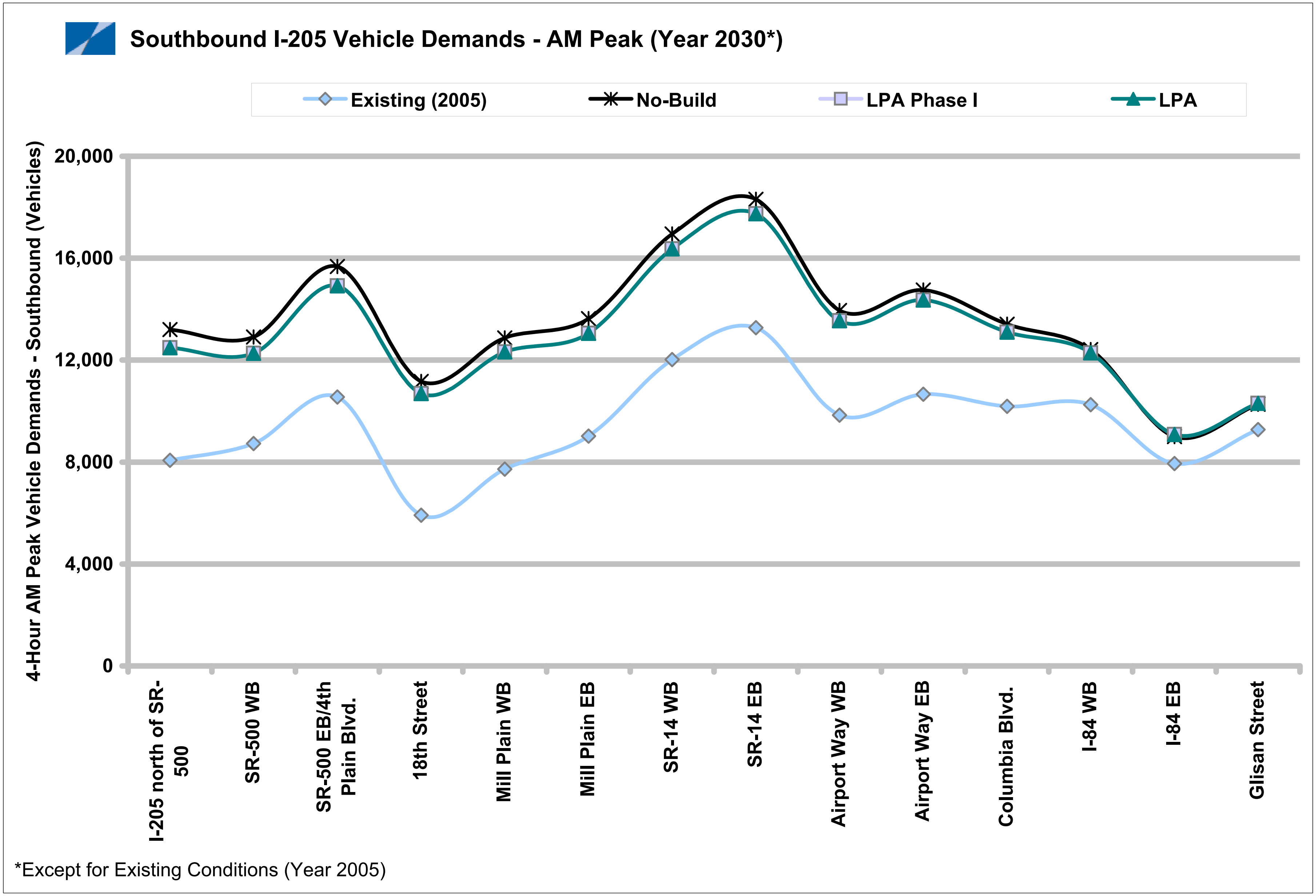
*Except for Existing Conditions (Year 2005)

Exhibit 7-5



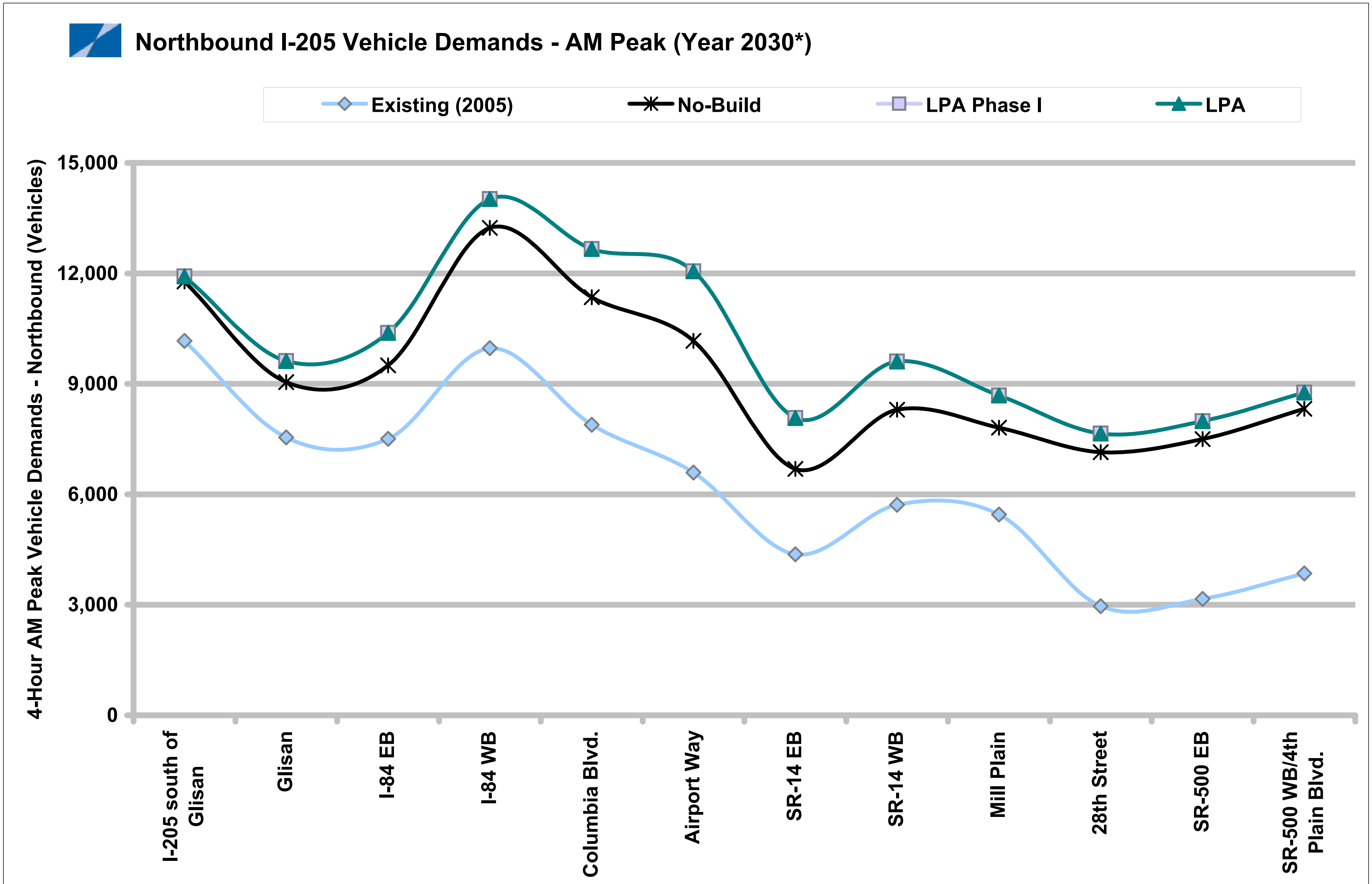
*Except for Existing Conditions (Year 2005)

Exhibit 7-6



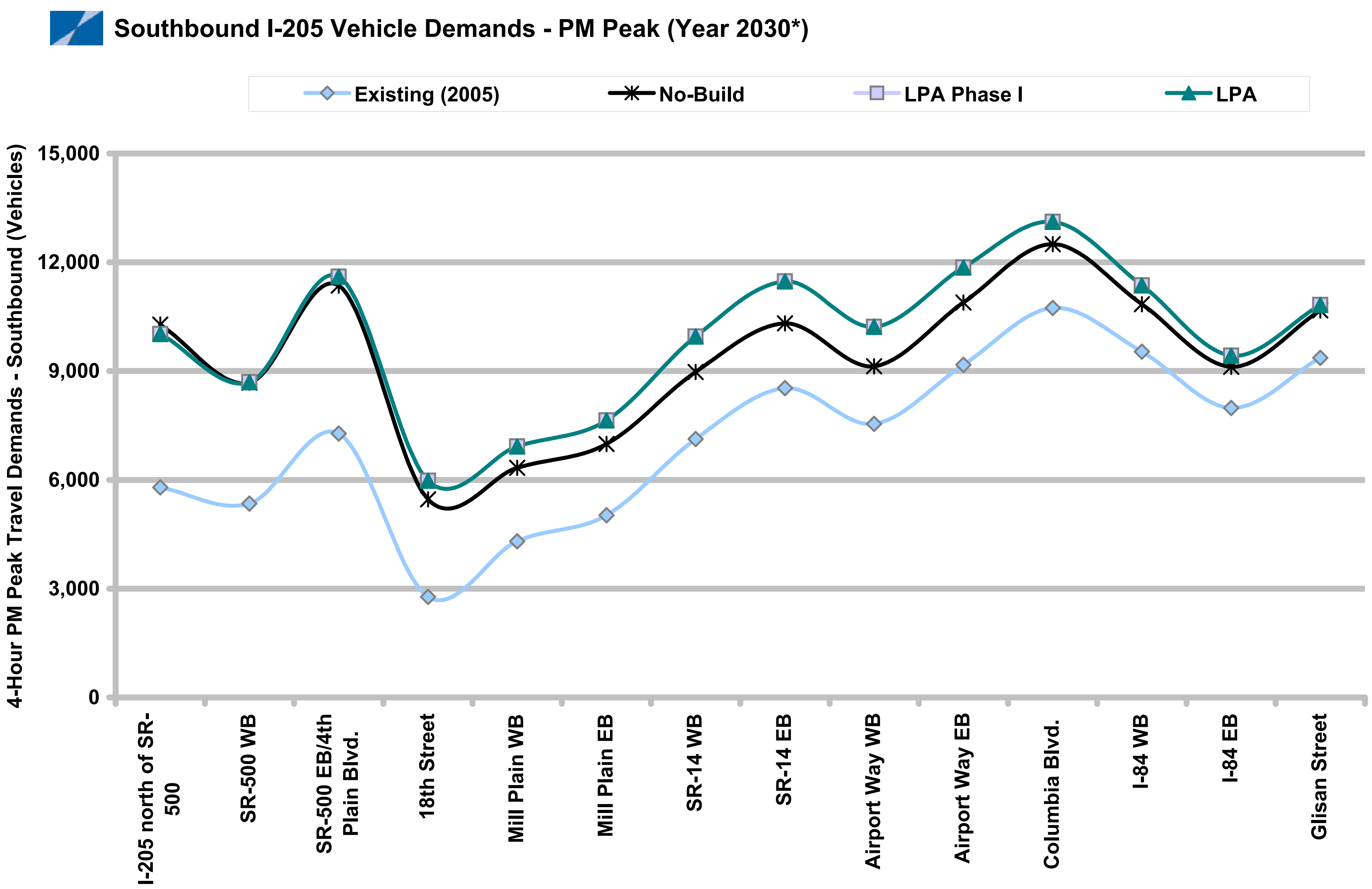
Southbound I-205 Vehicle Demands - AM Peak (Year 2030*)
Existing (2005)
No-Build
LPA Phase I
LPA
4-Hour AM Peak Vehicle Demands - Southbound (Vehicles)
20,000
16,000
12,000
8,000
4,000
0
I-205 north of SR-500
SR-500 WB
SR-500 EB/4th Plain Blvd.
18th Street
Mill Plain WB
Mill Plain EB
SR-14 WB
SR-14 EB
Airport Way WB
Airport Way EB
Columbia Blvd.
I-84 WB
I-84 EB
Glisan Street
*Except for Existing Conditions (Year 2005)

Exhibit 7-7



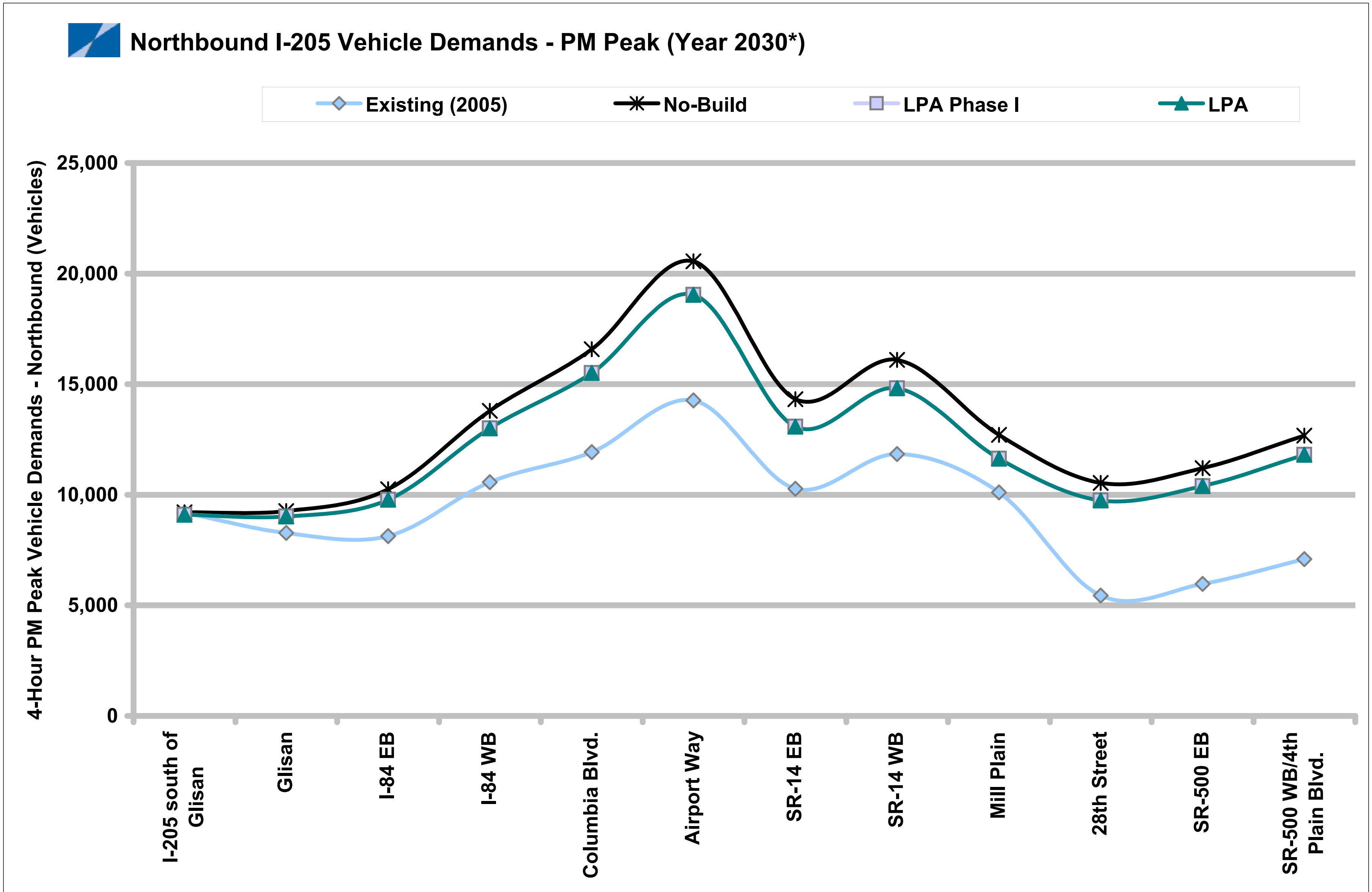
*Except for Existing Conditions (Year 2005)

Exhibit 7-8



*Except for Existing Conditions (Year 2005)

Exhibit 7-9



*Except for Existing Conditions (Year 2005)

Exhibit 7-10

Peak Period 2030 I-5 Truck Volume - Bridge Alternatives				
	No-Build		LPA	
Hours	Southbound	Northbound	Southbound	Northbound
AM Peak Period 6 AM - 10 AM	1,140	2,195	1,175	1,960
Midday Peak Period 10 AM - 3 PM	3,525	2,900	3,505	3,225
PM Peak Period 3 PM - 7 PM	2,350	1,635	2,335	1,900
Night 7 PM - 6 AM	2,790	2,870	2,790	2,515
Daily Total	**9,805**	**9,600**	**9,805**	**9,600**
Number hours of congestion[1]	7.25	7.75	3.50	2.00
Number trucks traveling in congestion	2,220	3,075	1,275	770

Source: Portland/Vancouver International and Domestic Trade Capacity Analysis, 2006 and CRC Project, September 2009

Exhibit 7-11

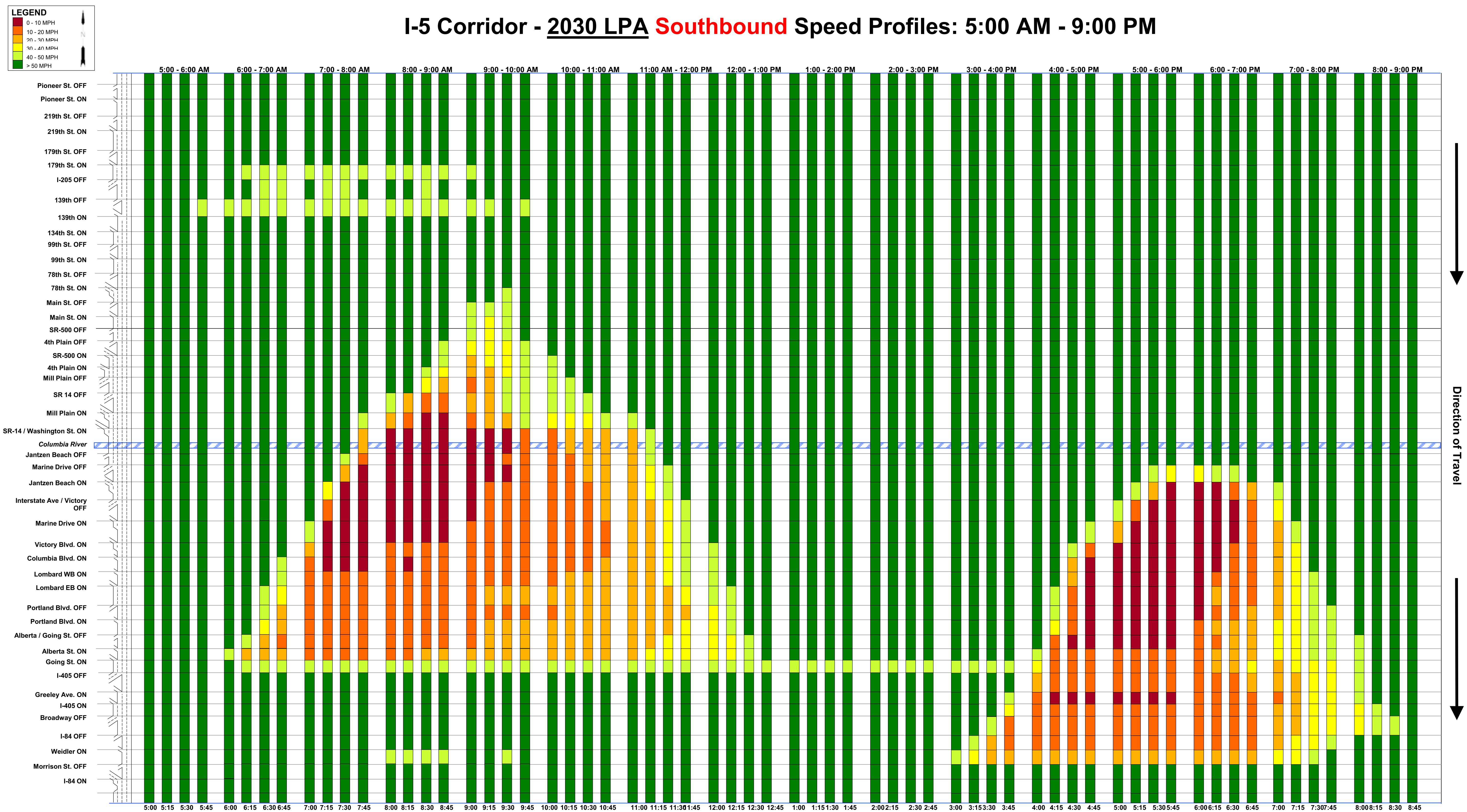

LEGEND
0 - 10 MPH
10 - 20 MPH
20 - 30 MPH
30 - 40 MPH
40 - 50 MPH
> 50 MPH
I-5 Corridor - 2030 LPA Southbound Speed Profiles: 5:00 AM - 9:00 PM
5:00 - 6:00 AM
6:00 - 7:00 AM
7:00 - 8:00 AM
8:00 - 9:00 AM
9:00 - 10:00 AM
10:00 - 11:00 AM
11:00 AM - 12:00 PM
12:00 - 1:00 PM
1:00 - 2:00 PM
2:00 - 3:00 PM
3:00 - 4:00 PM
4:00 - 5:00 PM
5:00 - 6:00 PM
6:00 - 7:00 PM
7:00 - 8:00 PM
8:00 - 9:00 PM
Pioneer St. OFF
Pioneer St. ON
219th St. OFF
219th St. ON
179th St. OFF
179th St. ON
I-205 OFF
139th OFF
139th ON
134th St. ON
99th St. OFF
99th St. ON
78th St. OFF
78th St. ON
Main St. OFF
Main St. ON
SR-500 OFF
4th Plain OFF
SR-500 ON
4th Plain ON
Mill Plain OFF
SR 14 OFF
Mill Plain ON
SR-14 / Washington St. ON
Columbia River
Jantzen Beach OFF
Marine Drive OFF
Jantzen Beach ON
Interstate Ave / Victory OFF
Marine Drive ON
Victory Blvd. ON
Columbia Blvd. ON
Lombard WB ON
Lombard EB ON
Portland Blvd. OFF
Portland Blvd. ON
Alberta / Going St. OFF
Alberta St. ON
Going St. ON
I-405 OFF
Greeley Ave. ON
I-405 ON
Broadway OFF
I-84 OFF
Weidler ON
Morrison St. OFF
I-84 ON
Direction of Travel
5:00 5:15 5:30 5:45 6:00 6:15 6:30 6:45 7:00 7:15 7:30 7:45 8:00 8:15 8:30 8:45 9:00 9:15 9:30 9:45 10:00 10:15 10:30 10:45 11:00 11:15 11:30 11:45 12:00 12:15 12:30 12:45 1:00 1:15 1:30 1:45 2:00 2:15 2:30 2:45 3:00 3:15 3:30 3:45 4:00 4:15 4:30 4:45 5:00 5:15 5:30 5:45 6:00 6:15 6:30 6:45 7:00 7:15 7:30 7:45 8:00 8:15 8:30 8:45

Exhibit 7-12

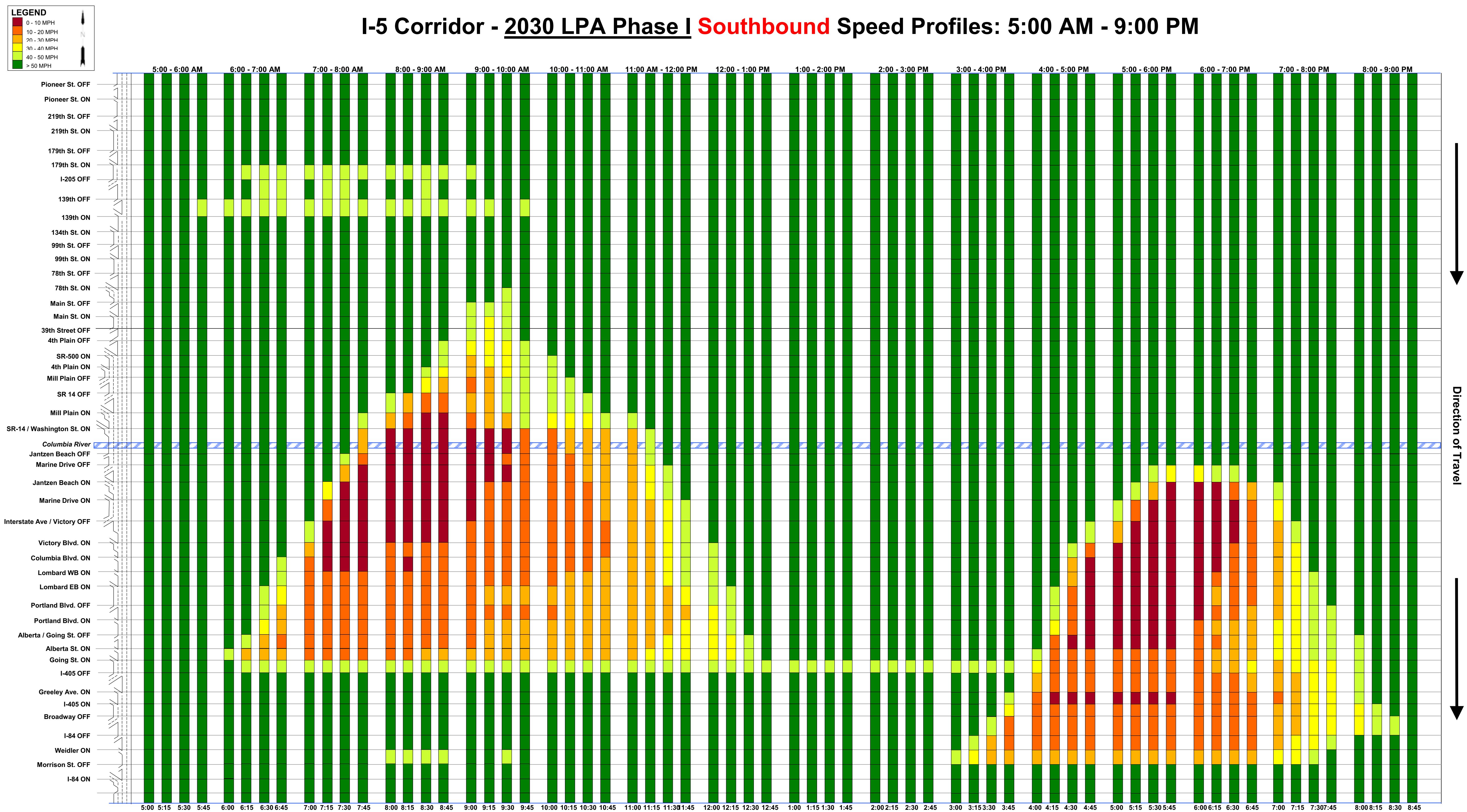
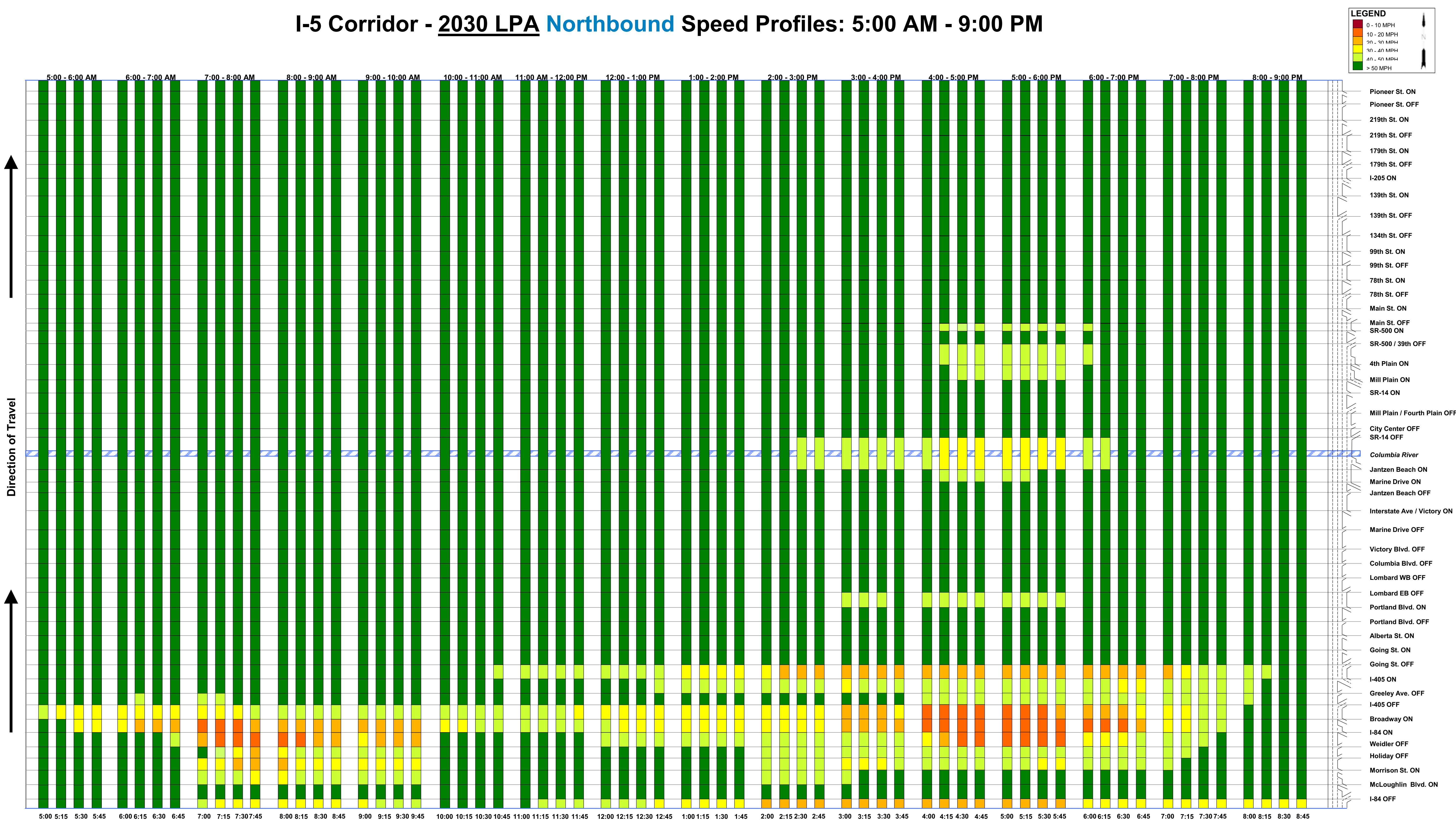

I-5 Corridor - 2030 LPA Phase I Southbound Speed Profiles: 5:00 AM - 9:00 PM
LEGEND
0 - 10 MPH
10 - 20 MPH
20 - 30 MPH
30 - 40 MPH
40 - 50 MPH
> 50 MPH
5:00 - 6:00 AM
6:00 - 7:00 AM
7:00 - 8:00 AM
8:00 - 9:00 AM
9:00 - 10:00 AM
10:00 - 11:00 AM
11:00 AM - 12:00 PM
12:00 - 1:00 PM
1:00 - 2:00 PM
2:00 - 3:00 PM
3:00 - 4:00 PM
4:00 - 5:00 PM
5:00 - 6:00 PM
6:00 - 7:00 PM
7:00 - 8:00 PM
8:00 - 9:00 PM
Pioneer St. OFF
Pioneer St. ON
219th St. OFF
219th St. ON
179th St. OFF
179th St. ON
I-205 OFF
139th OFF
139th ON
134th St. ON
99th St. OFF
99th St. ON
78th St. OFF
78th St. ON
Main St. OFF
Main St. ON
39th Street OFF
4th Plain OFF
SR-500 ON
4th Plain ON
Mill Plain OFF
SR 14 OFF
Mill Plain ON
SR-14 / Washington St. ON
Columbia River
Jantzen Beach OFF
Marine Drive OFF
Jantzen Beach ON
Marine Drive ON
Interstate Ave / Victory OFF
Victory Blvd. ON
Columbia Blvd. ON
Lombard WB ON
Lombard EB ON
Portland Blvd. OFF
Portland Blvd. ON
Alberta / Going St. OFF
Alberta St. ON
Going St. ON
I-405 OFF
Greeley Ave. ON
I-405 ON
Broadway OFF
I-84 OFF
Weidler ON
Morrison St. OFF
I-84 ON
Direction of Travel
5:00 5:15 5:30 5:45 6:00 6:15 6:30 6:45 7:00 7:15 7:30 7:45 8:00 8:15 8:30 8:45 9:00 9:15 9:30 9:45 10:00 10:15 10:30 10:45 11:00 11:15 11:30 11:45 12:00 12:15 12:30 12:45 1:00 1:15 1:30 1:45 2:00 2:15 2:30 2:45 3:00 3:15 3:30 3:45 4:00 4:15 4:30 4:45 5:00 5:15 5:30 5:45 6:00 6:15 6:30 6:45 7:00 7:15 7:30 7:45 8:00 8:15 8:30 8:45

Exhibit 7-13



I-5 Corridor - 2030 LPA Northbound Speed Profiles: 5:00 AM - 9:00 PM
LEGEND
0 - 10 MPH
10 - 20 MPH
20 - 30 MPH
30 - 40 MPH
40 - 50 MPH
> 50 MPH
5:00 - 6:00 AM
6:00 - 7:00 AM
7:00 - 8:00 AM
8:00 - 9:00 AM
9:00 - 10:00 AM
10:00 - 11:00 AM
11:00 AM - 12:00 PM
12:00 - 1:00 PM
1:00 - 2:00 PM
2:00 - 3:00 PM
3:00 - 4:00 PM
4:00 - 5:00 PM
5:00 - 6:00 PM
6:00 - 7:00 PM
7:00 - 8:00 PM
8:00 - 9:00 PM
Direction of Travel
Pioneer St. ON
Pioneer St. OFF
219th St. ON
219th St. OFF
179th St. ON
179th St. OFF
I-205 ON
139th St. ON
139th St. OFF
134th St. OFF
99th St. ON
99th St. OFF
78th St. ON
78th St. OFF
Main St. ON
Main St. OFF
SR-500 ON
SR-500 / 39th OFF
4th Plain ON
Mill Plain ON
SR-14 ON
Mill Plain / Fourth Plain OFF
City Center OFF
SR-14 OFF
Columbia River
Jantzen Beach ON
Marine Drive ON
Jantzen Beach OFF
Interstate Ave / Victory ON
Marine Drive OFF
Victory Blvd. OFF
Columbia Blvd. OFF
Lombard WB OFF
Lombard EB OFF
Portland Blvd. ON
Portland Blvd. OFF
Alberta St. ON
Going St. ON
Going St. OFF
I-405 ON
Greeley Ave. OFF
I-405 OFF
Broadway ON
I-84 ON
Weidler OFF
Holiday OFF
Morrison St. ON
McLoughlin Blvd. ON
I-84 OFF
5:00 5:15 5:30 5:45
6:00 6:15 6:30 6:45
7:00 7:15 7:30 7:45
8:00 8:15 8:30 8:45
9:00 9:15 9:30 9:45
10:00 10:15 10:30 10:45
11:00 11:15 11:30 11:45
12:00 12:15 12:30 12:45
1:00 1:15 1:30 1:45
2:00 2:15 2:30 2:45
3:00 3:15 3:30 3:45
4:00 4:15 4:30 4:45
5:00 5:15 5:30 5:45
6:00 6:15 6:30 6:45
7:00 7:15 7:30 7:45
8:00 8:15 8:30 8:45

Exhibit 7-14

I-5 Corridor - 2030 LPA Phase I Northbound Speed Profiles: 5:00 AM - 9:00 PM
LEGEND
0 - 10 MPH
10 - 20 MPH
20 - 30 MPH
30 - 40 MPH
40 - 50 MPH
> 50 MPH
Direction of Travel
5:00 - 6:00 AM
6:00 - 7:00 AM
7:00 - 8:00 AM
8:00 - 9:00 AM
9:00 - 10:00 AM
10:00 - 11:00 AM
11:00 AM - 12:00 PM
12:00 - 1:00 PM
1:00 - 2:00 PM
2:00 - 3:00 PM
3:00 - 4:00 PM
4:00 - 5:00 PM
5:00 - 6:00 PM
6:00 - 7:00 PM
7:00 - 8:00 PM
8:00 - 9:00 PM
Pioneer St. ON
Pioneer St. OFF
219th St. ON
219th St. OFF
179th St. ON
179th St. OFF
I-205 ON
139th St. ON
139th St. OFF
134th St. OFF
99th St. ON
99th St. OFF
78th St. ON
78th St. OFF
Main St. ON
Main St. OFF
39th St. ON
SR-500 / 39th OFF
4th Plain ON
Mill Plain ON
SR-14 ON
Mill Plain / 4th Plain OFF
City Center OFF
SR-14 OFF
Columbia River
Jantzen Beach ON
Marine Drive ON
Jantzen Beach OFF
Interstate Ave / Victory ON
Marine Drive OFF
Victory Blvd. OFF
Columbia Blvd. OFF
Lombard WB OFF
Lombard EB OFF
Portland Blvd. ON
Portland Blvd. OFF
Alberta St. ON
Going St. ON
Going St. OFF
I-405 ON
Greeley Ave. OFF
I-405 OFF
Broadway ON
I-84 ON
Weidler OFF
Holiday OFF
Morrison St. ON
McLoughlin Blvd. ON
I-84 OFF
5:00 5:15 5:30 5:45
6:00 6:15 6:30 6:45
7:00 7:15 7:30 7:45
8:00 8:15 8:30 8:45
9:00 9:15 9:30 9:45
10:00 10:15 10:30 10:45
11:00 11:15 11:30 11:45
12:00 12:15 12:30 12:45
1:00 1:15 1:30 1:45
2:00 2:15 2:30 2:45
3:00 3:15 3:30 3:45
4:00 4:15 4:30 4:45
5:00 5:15 5:30 5:45
6:00 6:15 6:30 6:45
7:00 7:15 7:30 7:45
8:00 8:15 8:30 8:45

Exhibit 7-15

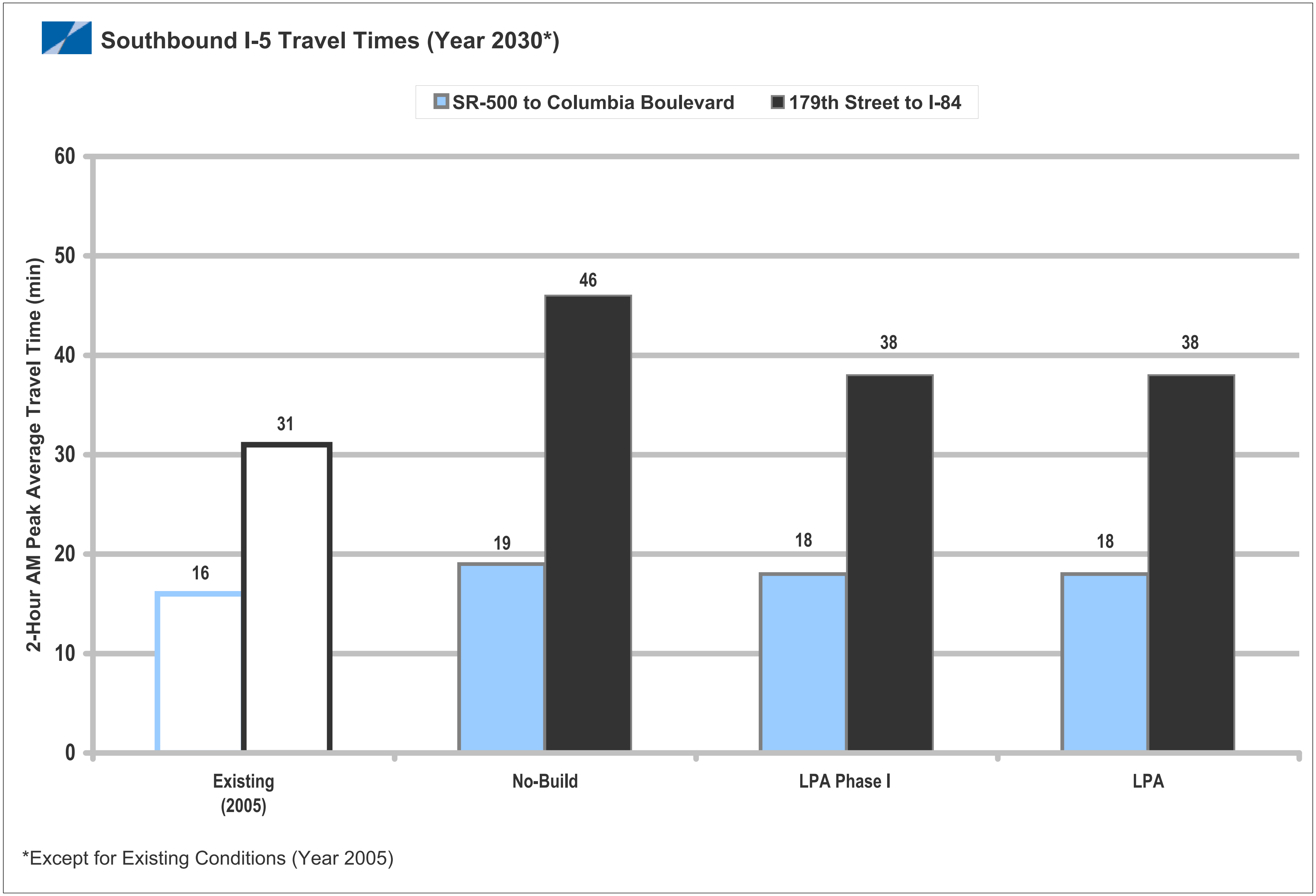
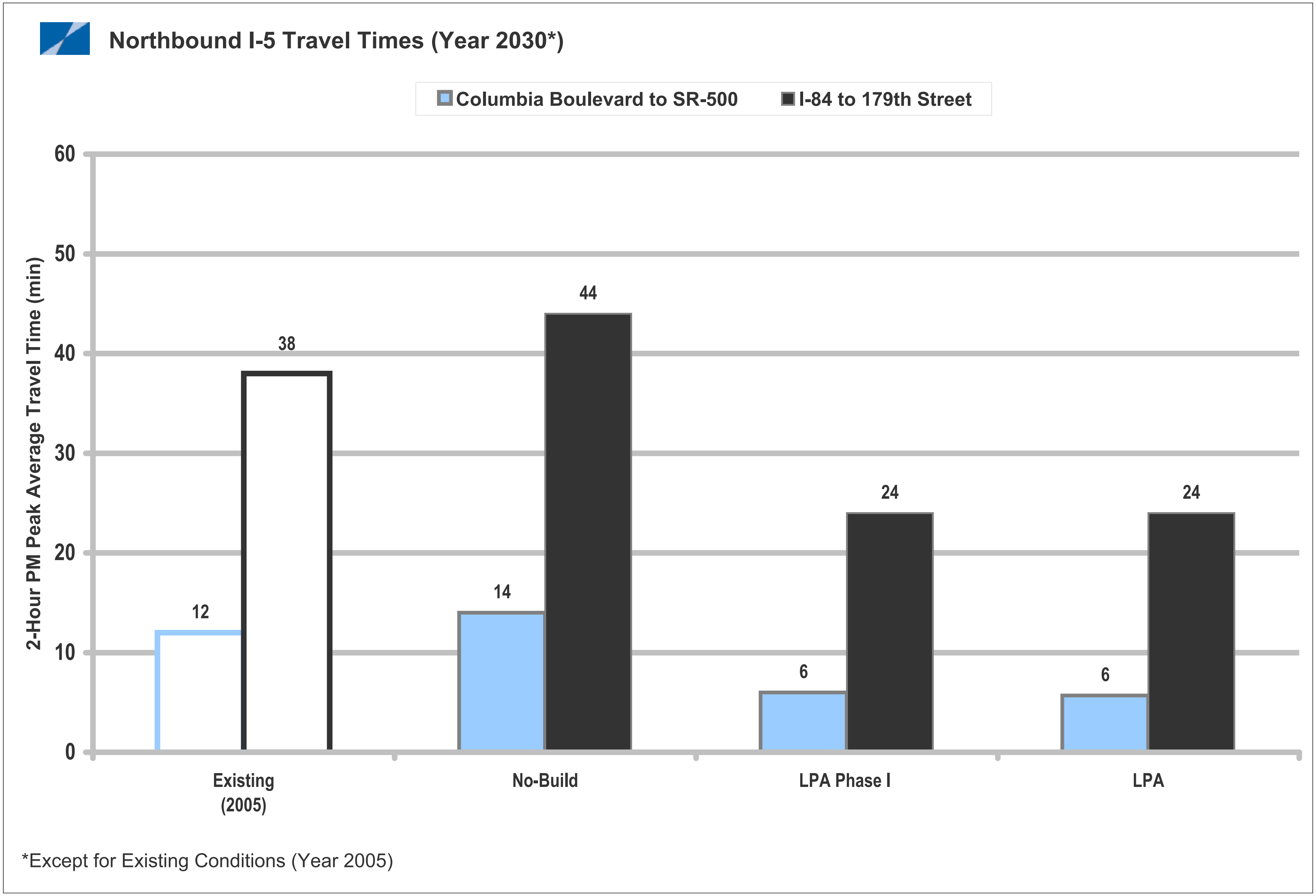
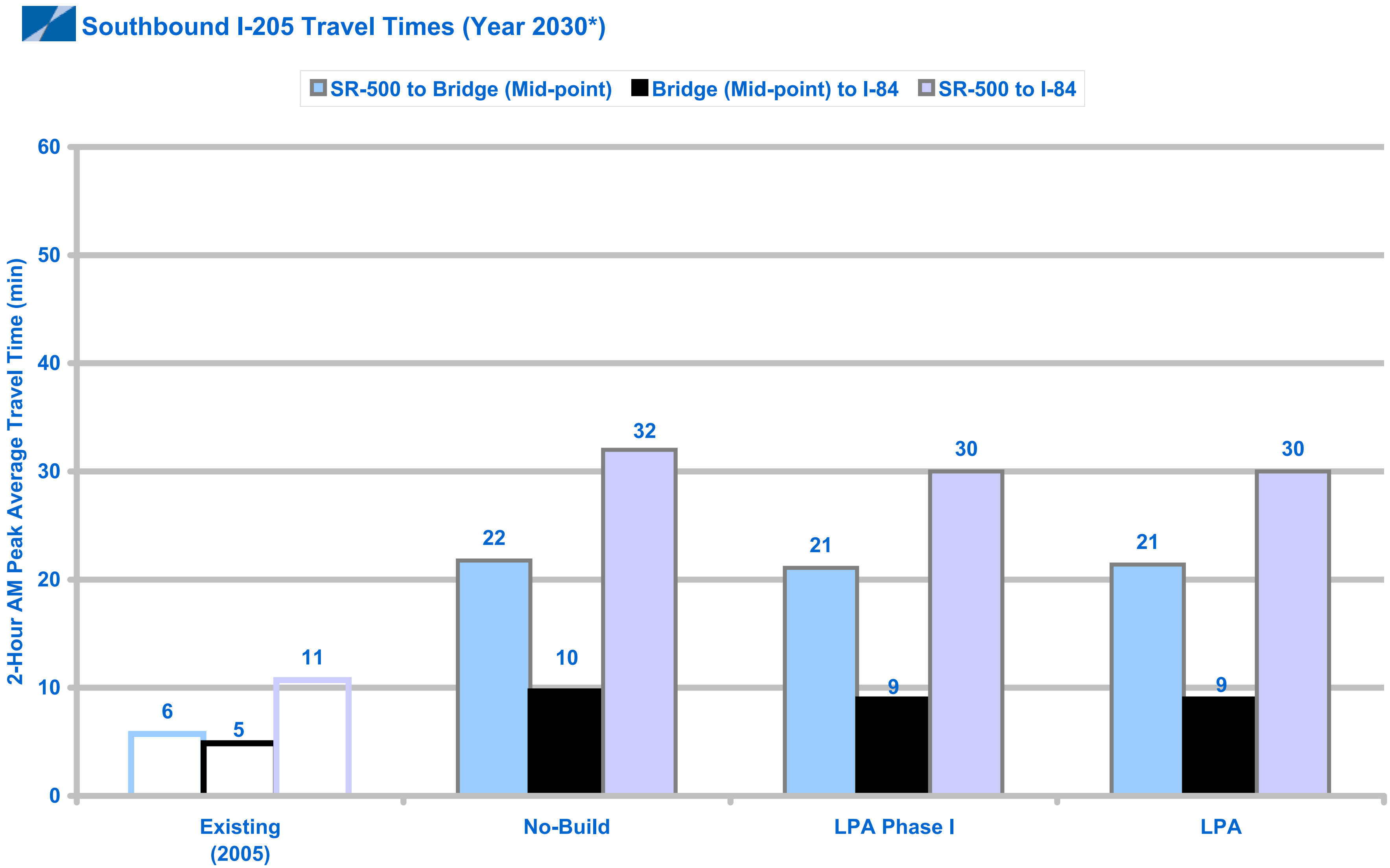

Southbound I-5 Travel Times (Year 2030*)
SR-500 to Columbia Boulevard
179th Street to I-84
2-Hour AM Peak Average Travel Time (min)
60
50
40
30
20
10
0
16
31
19
46
18
38
18
38
Existing (2005)
No-Build
LPA Phase I
LPA
*Except for Existing Conditions (Year 2005)

Exhibit 7-16



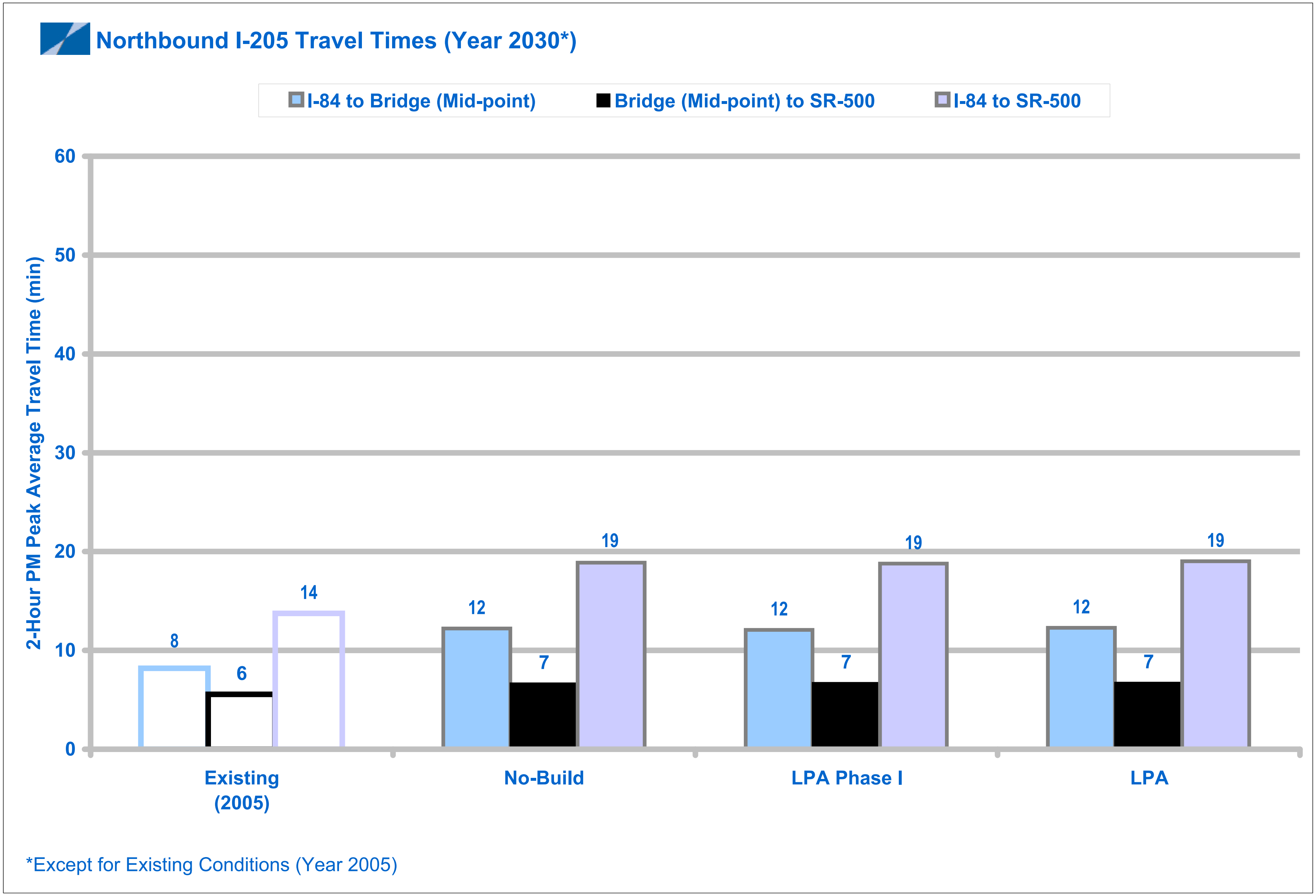
Northbound I-5 Travel Times (Year 2030*)
Columbia Boulevard to SR-500
I-84 to 179th Street
2-Hour PM Peak Average Travel Time (min)
60
50
40
30
20
10
0
12
38
14
44
6
24
6
24
Existing (2005)
No-Build
LPA Phase I
LPA
*Except for Existing Conditions (Year 2005)

Exhibit 7-17



*Except for Existing Conditions (Year 2005)

Exhibit 7-18



Northbound I-205 Travel Times (Year 2030*)
I-84 to Bridge (Mid-point)
Bridge (Mid-point) to SR-500
I-84 to SR-500
2-Hour PM Peak Average Travel Time (min)
60
50
40
30
20
10
0
8
6
14
12
7
19
12
7
19
12
7
19
Existing (2005)
No-Build
LPA Phase I
LPA
*Except for Existing Conditions (Year 2005)

Exhibit 7-19

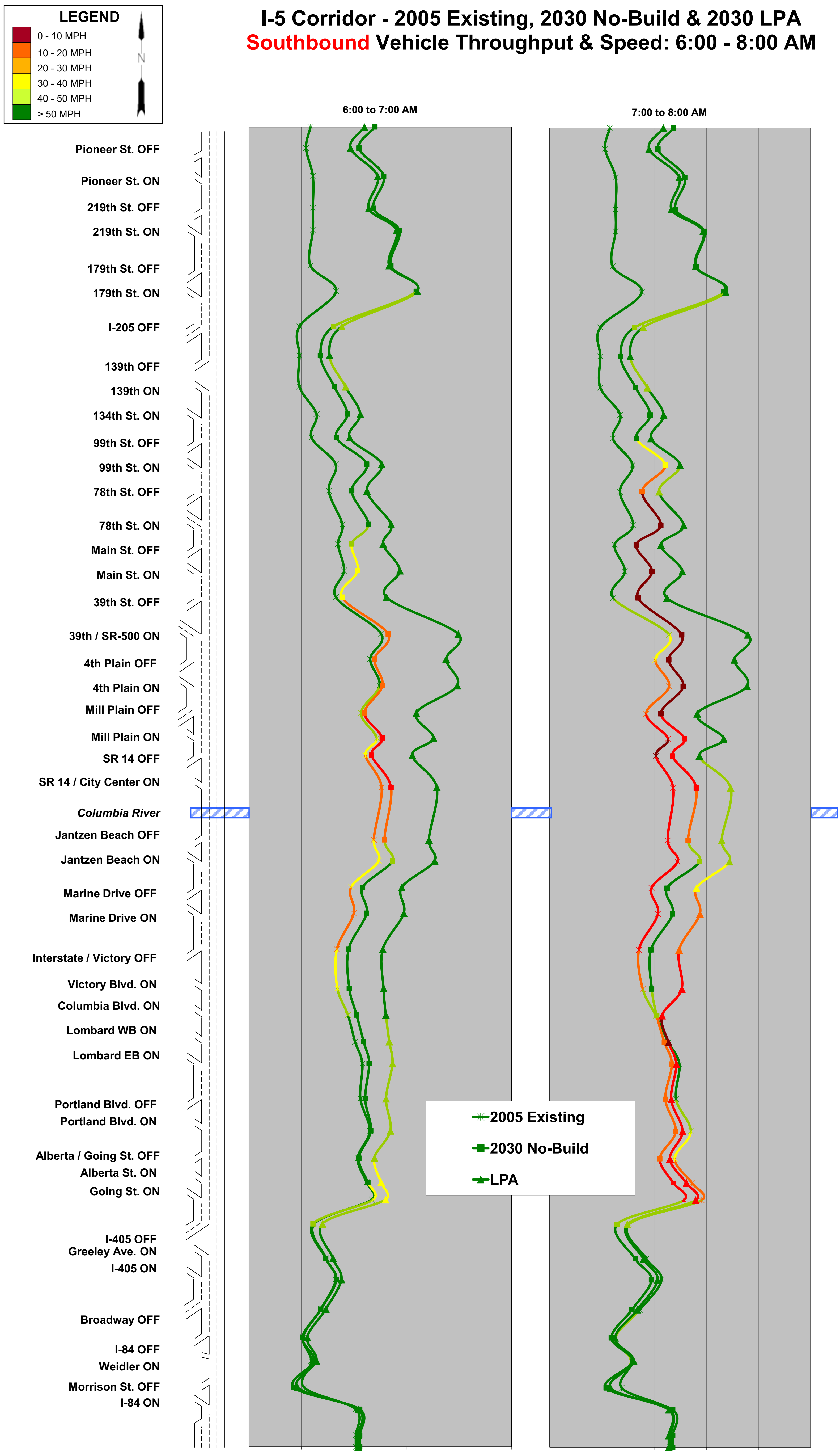

I-5 Corridor - 2005 Existing, 2030 No-Build & 2030 LPA
Southbound Vehicle Throughput & Speed: 6:00 - 8:00 AM
LEGEND
0 - 10 MPH
10 - 20 MPH
20 - 30 MPH
30 - 40 MPH
40 - 50 MPH
> 50 MPH
N
6:00 to 7:00 AM
7:00 to 8:00 AM
Pioneer St. OFF
Pioneer St. ON
219th St. OFF
219th St. ON
179th St. OFF
179th St. ON
I-205 OFF
139th OFF
139th ON
134th St. ON
99th St. OFF
99th St. ON
78th St. OFF
78th St. ON
Main St. OFF
Main St. ON
39th St. OFF
39th / SR-500 ON
4th Plain OFF
4th Plain ON
Mill Plain OFF
Mill Plain ON
SR 14 OFF
SR 14 / City Center ON
Columbia River
Jantzen Beach OFF
Jantzen Beach ON
Marine Drive OFF
Marine Drive ON
Interstate / Victory OFF
Victory Blvd. ON
Columbia Blvd. ON
Lombard WB ON
Lombard EB ON
Portland Blvd. OFF
Portland Blvd. ON
Alberta / Going St. OFF
Alberta St. ON
Going St. ON
I-405 OFF
Greeley Ave. ON
I-405 ON
Broadway OFF
I-84 OFF
Weidler ON
Morrison St. OFF
I-84 ON
2005 Existing
2030 No-Build
LPA
0
2,000
4,000
6,000
8,000
10,000
Direction of Travel

Exhibit 7-19 - continued

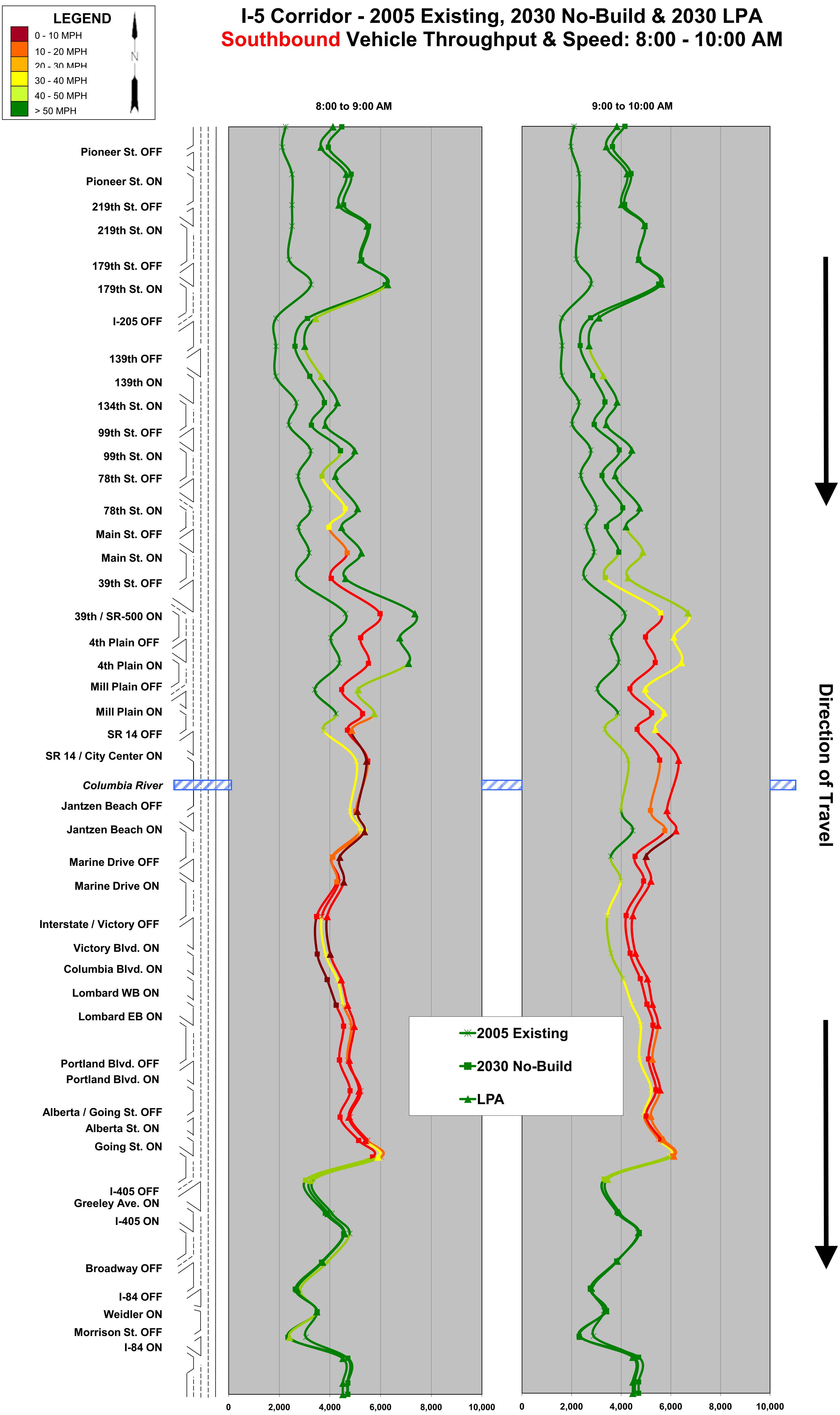
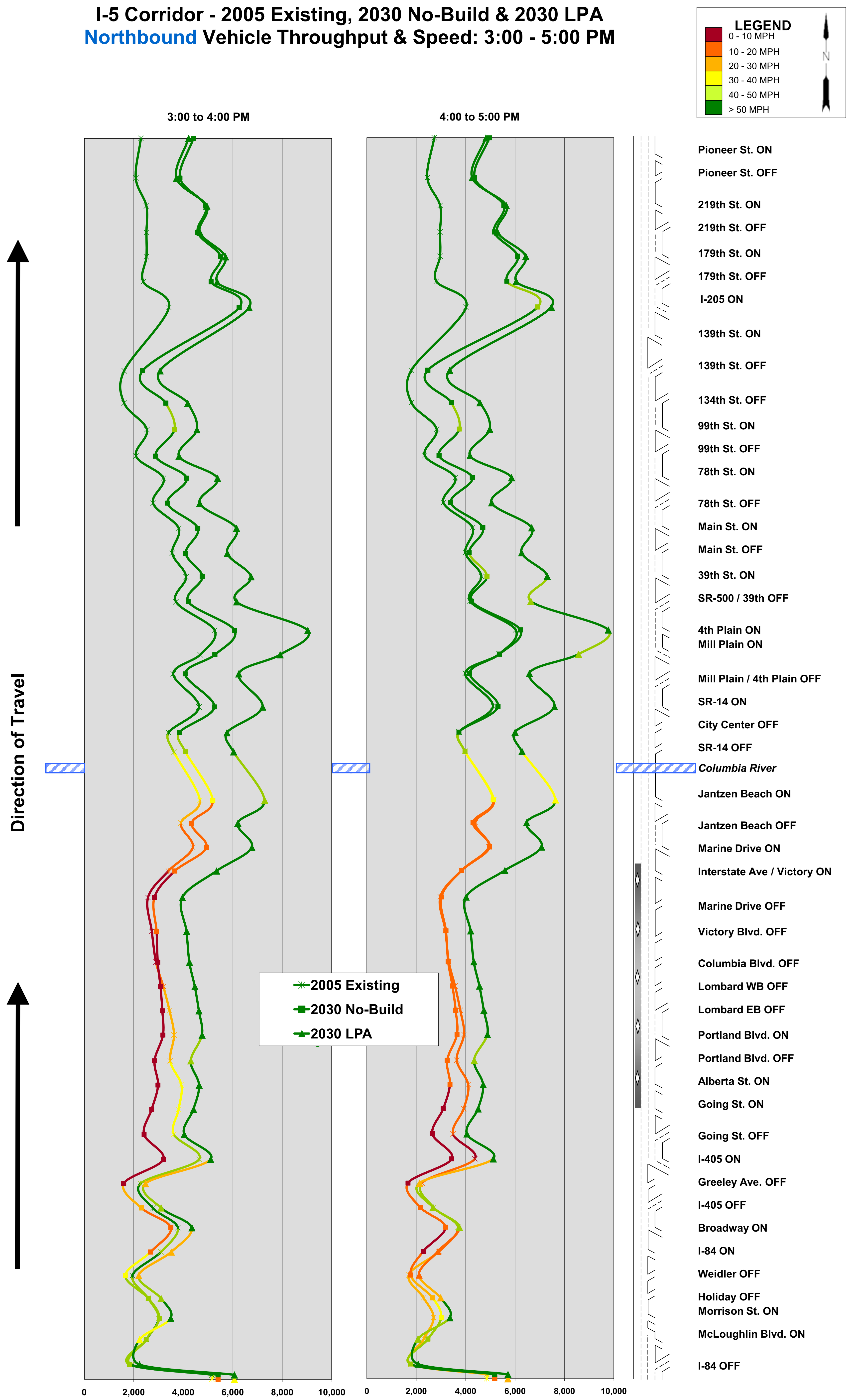


Exhibit 7-20



I-5 Corridor - 2005 Existing, 2030 No-Build & 2030 LPA
Northbound Vehicle Throughput & Speed: 3:00 - 5:00 PM
LEGEND
0 - 10 MPH
10 - 20 MPH
20 - 30 MPH
30 - 40 MPH
40 - 50 MPH
> 50 MPH
N
3:00 to 4:00 PM
4:00 to 5:00 PM
Direction of Travel
2005 Existing
2030 No-Build
2030 LPA
0
2,000
4,000
6,000
8,000
10,000
Pioneer St. ON
Pioneer St. OFF
219th St. ON
219th St. OFF
179th St. ON
179th St. OFF
I-205 ON
139th St. ON
139th St. OFF
134th St. OFF
99th St. ON
99th St. OFF
78th St. ON
78th St. OFF
Main St. ON
Main St. OFF
39th St. ON
SR-500 / 39th OFF
4th Plain ON
Mill Plain ON
Mill Plain / 4th Plain OFF
SR-14 ON
City Center OFF
SR-14 OFF
Columbia River
Jantzen Beach ON
Jantzen Beach OFF
Marine Drive ON
Interstate Ave / Victory ON
Marine Drive OFF
Victory Blvd. OFF
Columbia Blvd. OFF
Lombard WB OFF
Lombard EB OFF
Portland Blvd. ON
Portland Blvd. OFF
Alberta St. ON
Going St. ON
Going St. OFF
I-405 ON
Greeley Ave. OFF
I-405 OFF
Broadway ON
I-84 ON
Weidler OFF
Holiday OFF
Morrison St. ON
McLoughlin Blvd. ON
I-84 OFF

Exhibit 7-20 - continued

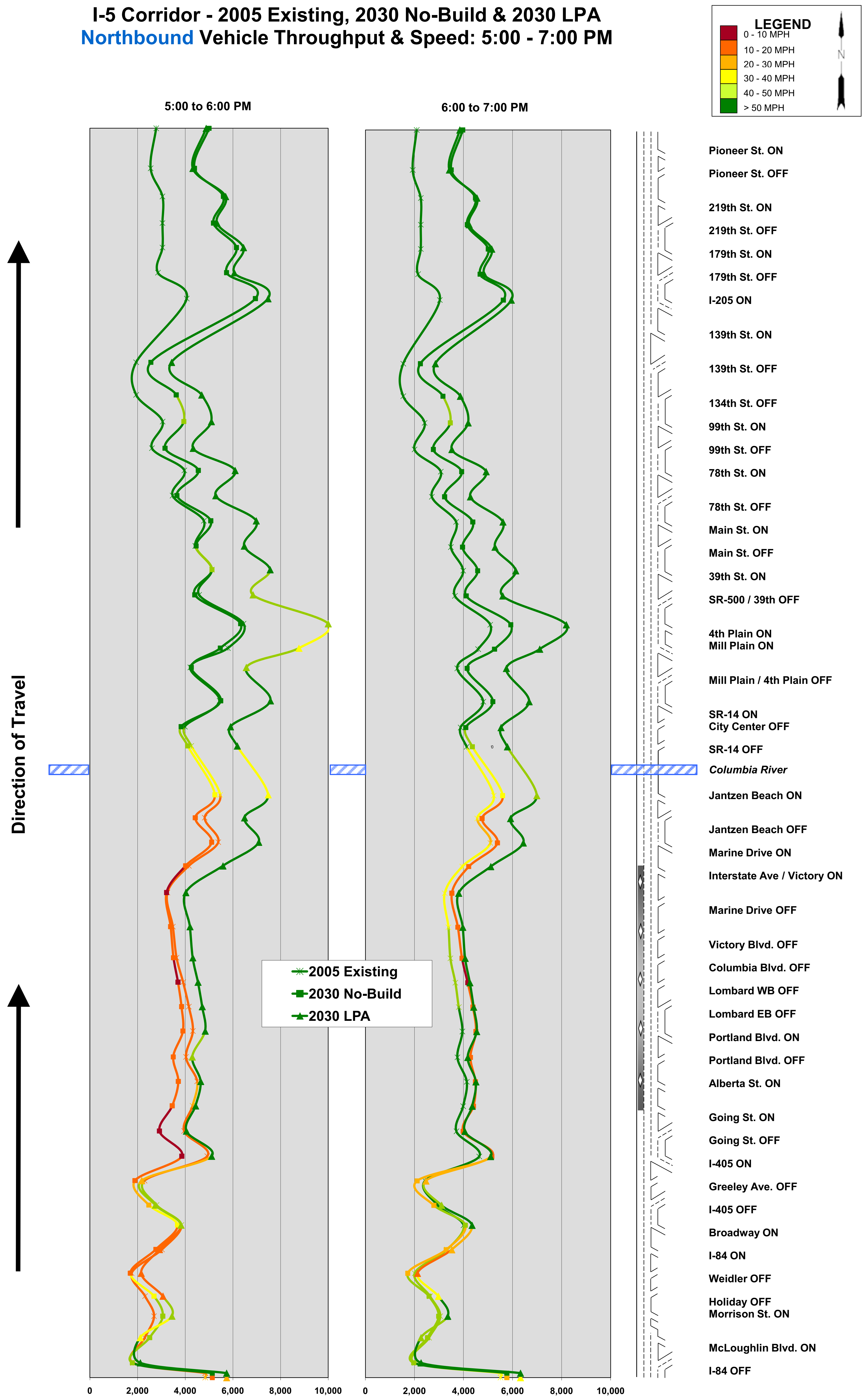
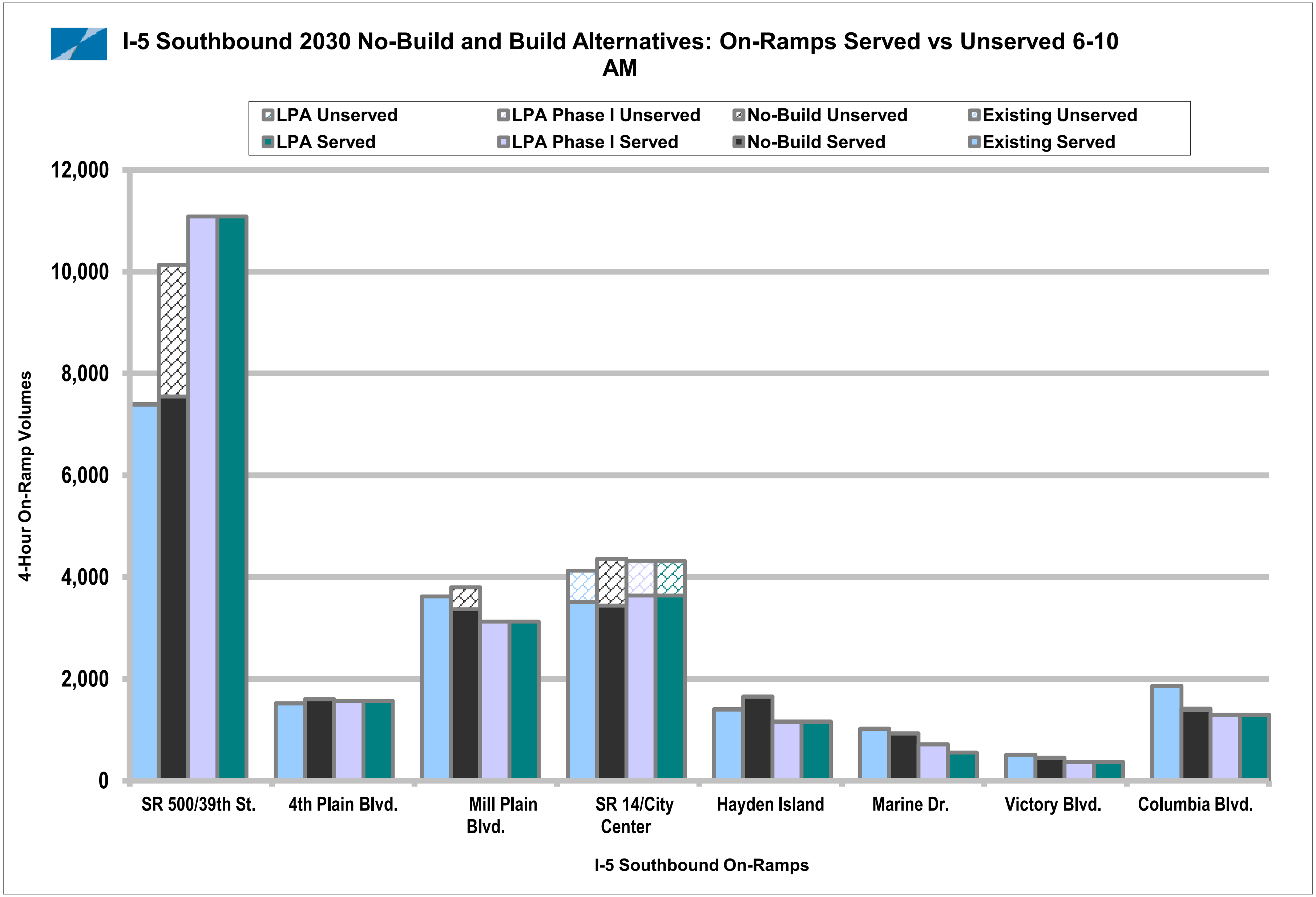


Exhibit 7-21



I-5 Southbound 2030 No-Build and Build Alternatives: On-Ramps Served vs Unserved 6-10 AM
LPA Unserved
LPA Phase I Unserved
No-Build Unserved
Existing Unserved
LPA Served
LPA Phase I Served
No-Build Served
Existing Served
12,000
10,000
8,000
6,000
4,000
2,000
0
4-Hour On-Ramp Volumes
SR 500/39th St.
4th Plain Blvd.
Mill Plain Blvd.
SR 14/City Center
Hayden Island
Marine Dr.
Victory Blvd.
Columbia Blvd.
I-5 Southbound On-Ramps

Exhibit 7-22

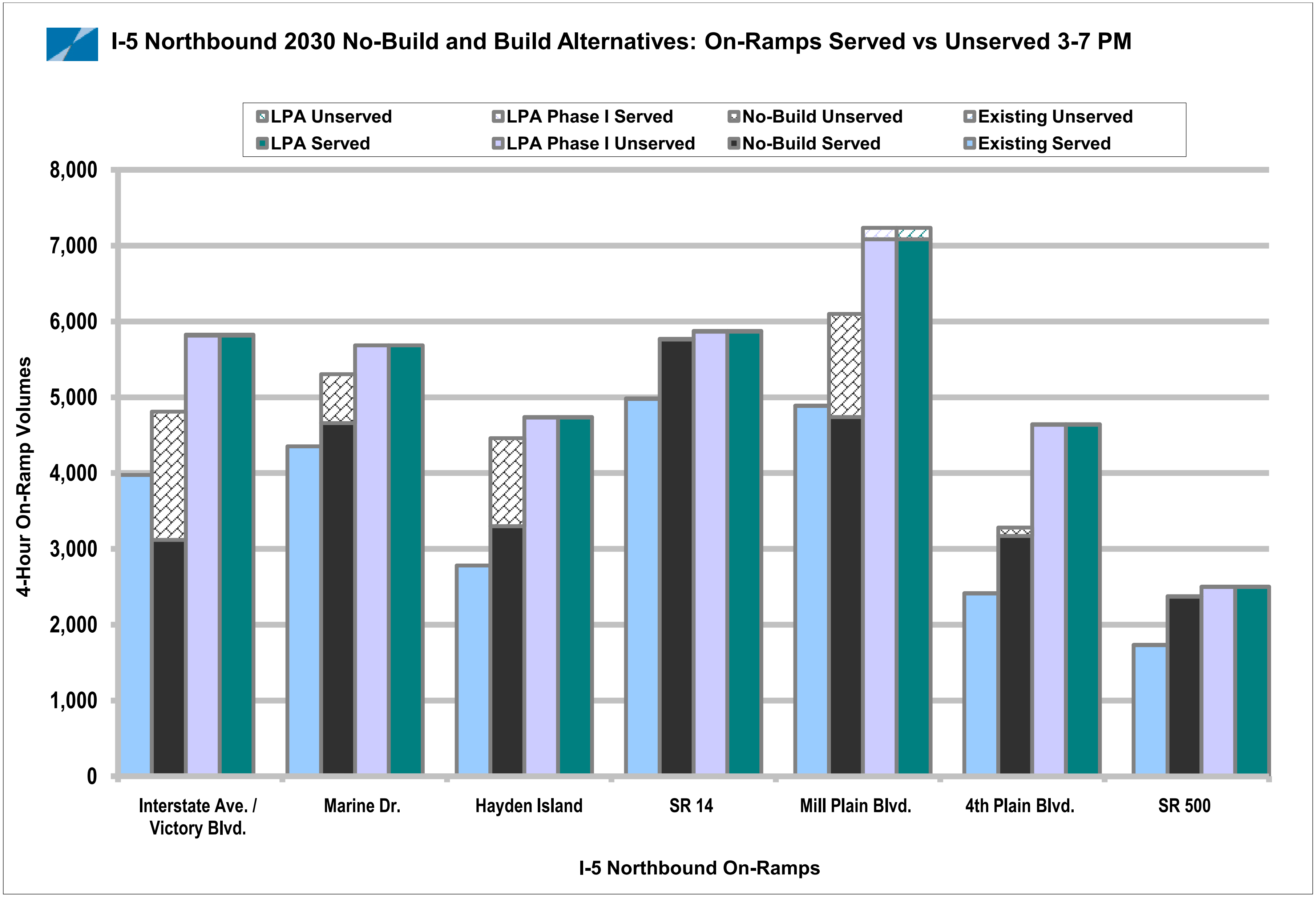
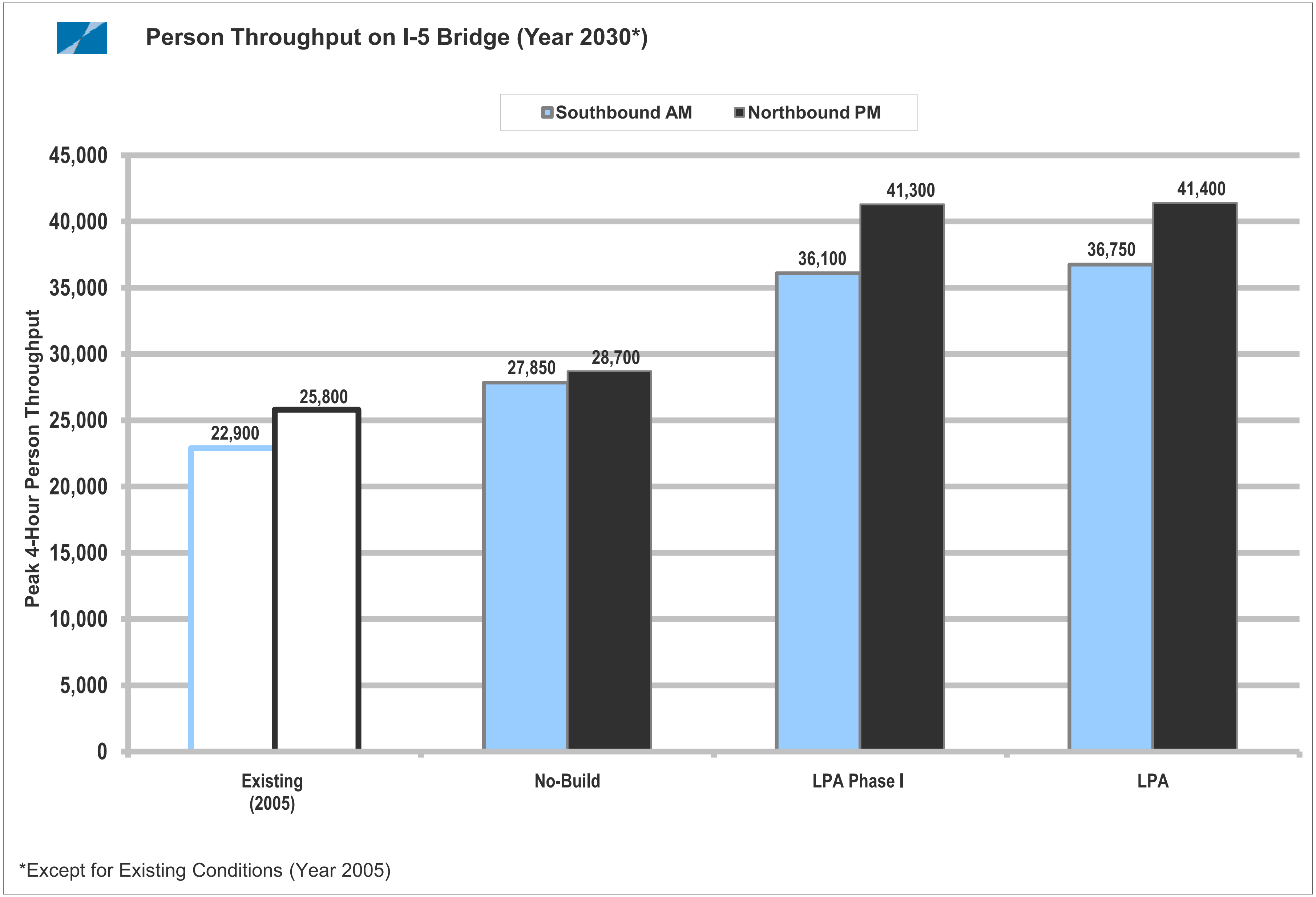

I-5 Northbound 2030 No-Build and Build Alternatives: On-Ramps Served vs Unserved 3-7 PM
LPA Unserved
LPA Served
LPA Phase I Served
LPA Phase I Unserved
No-Build Unserved
No-Build Served
Existing Unserved
Existing Served
4-Hour On-Ramp Volumes
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
Interstate Ave. / Victory Blvd.
Marine Dr.
Hayden Island
SR 14
Mill Plain Blvd.
4th Plain Blvd.
SR 500
I-5 Northbound On-Ramps

Exhibit 7-23



Person Throughput on I-5 Bridge (Year 2030*)
Southbound AM
Northbound PM
Peak 4-Hour Person Throughput
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
22,900
25,800
27,850
28,700
36,100
41,300
36,750
41,400
Existing (2005)
No-Build
LPA Phase I
LPA
*Except for Existing Conditions (Year 2005)

Exhibit 7-24

Screenline	2030 No Build	2030 LPA Phase 1	Difference from No Build	2030 LPA	Difference from No Build
Vancouver North-South Screenlines - AM Peak Hour Volumes					
West of Franklin St					
Westbound Total	2,850	3,150	11%	3,150	11%
Eastbound Total	2,000	2,300	15%	2,300	15%
West of I-5					
Westbound Total	4,450	5,050	13%	5,050	13%
Eastbound Total	3,350	3,900	16%	3,750	12%
East of I-5					
Westbound Total	3,450	3,500	1%	3,500	1%
Eastbound Total	3,000	3,850	28%	3,100	3%

Screenline	2030 No Build	2030 LPA Phase 1	Difference from No Build	2030 LPA	Difference from No Build
Vancouver East-West Screenlines - AM Peak Hour Volumes					
North of Evergreen Blvd					
Southbound Total	1,450	1,600	10%	1,600	10%
Northbound Total	1,050	1,100	5%	1,100	5%
North of 15th St					
Southbound Total	2,100	1,800	-14%	1,800	-14%
Northbound Total	500	600	20%	600	20%
North of 4th Plain Blvd					
Southbound Total	2,200	1,650	-25%	1,650	-25%
Northbound Total	350	450	29%	450	29%
North of 39th St					
Southbound Total	1,250	850	-32%	850	-32%
Northbound Total	250	450	80%	450	80%

Exhibit 7-25

Vancouver North-South Screenlines - PM Peak Hour Volumes					
Screenline	2030 No Build	2030 LPA Phase 1	Difference from No Build	2030 LPA	Difference from No Build
West of Franklin St					
Westbound Total	2,500	2,950	18%	2,950	18%
Eastbound Total	3,500	3,600	3%	3,600	3%
West of I-5					
Westbound Total	3,950	4,450	13%	4,450	13%
Eastbound Total	5,950	6,550	10%	6,300	6%
East of I-5					
Westbound Total	3,050	3,450	13%	3,450	13%
Eastbound Total	5,800	5,250	-9%	4,350	-25%

Vancouver East-West Screenlines - PM Peak Hour Volumes					
Screenline	2030 No Build	2030 LPA Phase 1	Difference from No Build	2030 LPA	Difference from No Build
North of Evergreen Blvd					
Southbound Total	1,050	1,200	14%	1,200	14%
Northbound Total	1,850	1,750	-5%	1,750	-5%
North of 15th St					
Southbound Total	1,000	1,050	5%	1,050	5%
Northbound Total	1,350	1,250	-7%	1,250	-7%
North of 4th Plain Blvd					
Southbound Total	650	650	0%	650	0%
Northbound Total	1,300	950	-27%	950	-27%
North of 39th St					
Southbound Total	550	650	18%	650	18%
Northbound Total	950	900	-5%	900	-5%

Exhibit 7-26

Portland North-South Screenlines - AM Peak Hour Volumes					
Screenline	**2030 No-Build**	**2030 LPA Phase I**	**Difference from No-Build**	**2030 LPA**	**Difference from No-Build**
West of Interstate					
Westbound Total	4,250	4,250	0%	4,250	0%
Eastbound Total	3,200	2,900	-9%	2,900	-9%
East of I-5					
Westbound Total	3,450	3,150	-9%	3,150	-9%
Eastbound Total	2,950	3,050	3%	3,050	3%
East of MLK Jr Blvd					
Westbound Total	3,950	3,900	-1%	3,900	-1%
Eastbound Total	2,850	3,100	9%	3,100	9%

Portland East-West Screenlines - AM Peak Hour Volumes					
Screenline	**2030 No-Build**	**2030 LPA Phase I**	**Difference from No-Build**	**2030 LPA**	**Difference from No-Build**
Columbia Slough					
Southbound Total	1,400	1,400	0%	1,400	0%
Northbound Total	1,150	1,050	-9%	1,050	-9%
North of Rosa Parks					
Southbound Total	1,150	1,200	4%	1,200	4%
Northbound Total	750	750	0%	750	0%
South of Alberta St					
Southbound Total	1,800	1,800	0%	1,800	0%
Northbound Total	1,250	1,000	-20%	1,000	-20%

Exhibit 7-27

Portland North-South Screenlines - PM Peak Hour Volumes					
Screenline	2030 No-Build	2030 LPA Phase I	Difference from No-Build	2030 LPA	Difference from No-Build
West of Interstate					
Westbound Total	3,100	3,200	3%	3,200	3%
Eastbound Total	4,950	4,700	-5%	4,700	-5%
East of I-5					
Westbound Total	3,300	3,550	8%	3,550	8%
Eastbound Total	3,850	3,650	-5%	3,650	-5%
East of MLK Jr Blvd					
Westbound Total	3,300	3,200	-3%	3,200	-3%
Eastbound Total	4,050	3,900	-4%	3,900	-4%

Portland East-West Screenlines - PM Peak Hour Volumes					
Screenline	2030 No-Build	2030 LPA Phase I	Difference from No-Build	2030 LPA	Difference from No-Build
Columbia Slough					
Southbound Total	1,450	1,350	-7%	1,350	-7%
Northbound Total	1,550	1,650	6%	1,650	6%
North of Rosa Parks					
Southbound Total	1,550	1,400	-10%	1,400	-10%
Northbound Total	1,850	1,900	3%	1,900	3%
South of Alberta St					
Southbound Total	1,750	1,600	-9%	1,600	-9%
Northbound Total	2,550	2,400	-6%	2,400	-6%

Exhibit 7-28

Applicable Local Street Intersection Performance Criteria for LPA

Vancouver Intersection Performance Criteria

No-Build	LPA	Determination	Mitigation?
LOS E or better ≤ 80 seconds(1)	LOS E or better ≤ 80 seconds	No project impact	No
LOS E or better ≤ 80 seconds	LOS F > 80 seconds	Significant project-related impact	**Yes**
LOS F > 80 and ≤ 100 seconds	LOS E or better ≤ 80 seconds	Project-related benefit	No
LOS F > 80 and ≤ 100 seconds(2)	LOS F > 80 and ≤ 100 seconds	No project impact if delay within established range is lower under build alternative	No
LOS F > 80 and ≤ 100 seconds(2)	LOS F > 80 and ≤ 100 seconds	Significant project-related impact if delay within established range is at least 10 seconds higher under build alternative	**Yes**
LOS F > 100 seconds(3)	LOS F < 100 seconds	Project-related benefit	No
LOS F > 100 seconds	LOS F > 100 seconds	No project impact	No

Portland Intersection Performance Criteria

No-Build	LPA	Determination	Mitigation?
LOS D or better ≤ 55 seconds	LOS D or better ≤ 55 seconds	No project impact	No
LOS D or better ≤ 55 seconds	LOS E or worse > 55 seconds	Significant project-related impact	**Yes**
LOS E ≤ 80 seconds	LOS E ≤ 80 seconds	Significant project-related impact if delay within established range is at least 10 seconds higher under build alternative	**Yes**
LOS F > 80 seconds	LOS E or better ≤ 80 seconds	Project-related benefit	No
LOS F > 80 seconds(2)	LOS F > 80 seconds	No project impact	No
V/C ≤ 0.85(4) or ≤ 0.99(5)	V/C > 0.85(4) or > 0.99(5)	Significant project-related impact	**Yes**
V/C ≤ 0.85(4) or ≤ 0.99(5)	V/C ≤ 0.85(4) or ≤ 0.99(5)	No project impact	No

(1) Refers to average delay per vehicle entering the intersection.

(2) LOS F gradations not established within this range.

(3) Assumed level of delay at which point motorists would change route, travel mode, or time of day for trip.

(4) A V/C ratio of 0.85 is used for ramp terminals in all scenarios.

(5) A V/C ratio of 0.99 is used for ODOT intersections that are not ramp terminals in all scenarios.

Exhibit 7-29

FEIS LPA Park-and-Ride Trip Generation								
	Trip	Parking	AM Peak Hour Trip Generation			PM Peak Hour Trip Generation		
Park-and-Ride Lot	Type	Spaces	Inbound	Outbound	Total	Inbound	Outbound	Total
Columbia	Park-and-Ride	570	200	0	**200**	0	170	**170**
	Kiss-and-Ride		55	55	**110**	55	55	**110**
	Total	570	255	55	**310**	55	225	**280**
Mill	Park-and-Ride	420	145	0	**145**	0	125	**125**
	Kiss-and-Ride		40	40	**80**	40	40	**80**
	Total	420	185	40	**225**	40	165	**205**
Clark	Park-and-Ride	1,910	670	0	**670**	0	575	**575**
	Kiss-and-Ride		190	190	**380**	190	190	**380**
	Total	1,910	860	190	**1,050**	190	765	**955**
Total	**Park-and-Ride**	**2,900**	**1,015**	**0**	**1,015**	**0**	**870**	**870**
	Kiss-and-Ride		**285**	**285**	**570**	**285**	**285**	**570**
	Total	**2,900**	**1,300**	**285**	**1,585**	**285**	**1,155**	**1,440**

AM Inbound % - Parking	**35%**
AM Inbound % - Kiss & Ride	10%
AM Outbound % - Kiss & Ride	10%
PM Outbound % - Parking	**30%**
PM Inbound % - Kiss & Ride	10%
PM Outbound % - Kiss & Ride	10%

Exhibit 7-30

Principal Arterial
Minor Arterial
Collector
Intersection Analyzed
Sub-areas
New Bridge
Existing Bridge
Roadway Improvements
Tunnel
New Transit Alignment
New Bicycle/Pedestrian Route
Existing MAX Yellow Line/Station
Parks
Ponds
Sidewalks

LPA
SR 14 Interchange Sub-area

Columbia River CROSSING

Exhibit 7-31

Vancouver Intersection Performance Results

AM Peak Hour		2030 No-Build								2030 LPA with Highway Phasing (Broadway-Washington/17th)								2030 LPA (Broadway-Washington/17th)								
#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)	Approach/Movement	Delay (Seconds)	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)
A	Esther St. @ Columbia Way	Eastbound Left	5.6	A	0.01	LOS E	Y	-	-	Southbound Left/Right	5.4	A	0.32	LOS E	Y	-	-	Southbound Left/Right	5.4	5.4	A	0.32	LOS E	Y	-	-
B	Columbia St. @ Columbia Way[3]	Eastbound Left	4.5	A	0.05	LOS E	Y	-	-	Southbound Left/Right	2.3	A	0.29	LOS E	Y	-	-	Southbound Left/Right	2.3	2.3	A	0.29	LOS E	Y	-	-
AA	Main St. @ Columbia Way[3]				-					Westbound Thru/Right	1.3	A	0.25	LOS E	Y	-	-	Westbound Thru/Right	1.3	1.3	A	0.25	LOS E	Y	-	-
01	3rd/4th St. @ Columbia St[3]	Eastbound Left/Right	4.8	A	0.04	LOS E	Y	-	-	Southbound Left/Thru/Right	7.8	A	0.73	LOS E	Y	-	-	Southbound Left/Thru/Right	7.8	7.8	A	0.73	LOS E	Y	-	-
BB	SR 14 and Main Street[3]									Southbound Left/Thru	2.4	A	0.34	LOS E	Y	-	-	Southbound Left/Thru	2.4	2.4	A	0.34	LOS E	Y	-	-
CC	SR 14 Park and Ride @ Main Street									Southbound Thru/Right	1.3	A	0.24	LOS E	Y	-	-	Southbound Thru/Right	1.3	1.3	A	0.24	LOS E	Y	-	-
C	3rd/4th St. @ Esther St.	Westbound Left/Right	3.6	A	0.09	LOS E	Y	-	-	Westbound Left/Right	5.1	A	0.31	LOS E	Y	-	-	Westbound Left/Right	5.1	5.1	A	0.31	LOS E	Y	-	-
02	4th St. @ Columbia St.	Northbound Thru/Right	0.2	A	0.08	LOS E	Y	-	-																	
03	4th St. @ Washington St.	Eastbound Right	2.7	A	0.03	LOS E	Y	-	-																	
04	5th St. @ Columbia St.	Southbound Left	3.0	A	0.12	LOS E	Y	-	-	Southbound Left	8.7	A	0.15	LOS E	Y	-	-	Southbound Left	8.7	8.7	A	0.15	LOS E	Y	-	-
DD	5th St. @ Columbia Park and Ride									Northbound Left/Right	2.6	A	0.07	LOS E	Y	-	-	Northbound Left/Right	2.6	2.6	A	0.07	LOS E	Y	-	-
05	5th St. @ Washington St.	Overall Intersection	9.5	A	0.44	LOS E	Y	-	-	Overall Intersection	9.2	A	0.43	LOS E	Y	-	-	Overall Intersection	9.2	9.2	A	0.43	LOS E	Y	-	-
EE	5th St. @ Main St.									Overall Intersection	18.2	B	0.80	LOS E	Y	160 75 185	175 (EBLTR) 100 (SBL) 200 (SBTR)	Overall Intersection	18.2	18.2	B	0.80	LOS E	Y	160 75 185	175 (EBLTR) 100 (SBL) 200 (SBTR)
06	6th St. @ Columbia St.	Overall Intersection	7.9	A	0.45	LOS E	Y	-	-	Overall Intersection	15.0	B	0.98	LOS E	Y	200 75 205	200 (WBLTR) 100 (NBL) 225 (NBTR)	Overall Intersection	15.0	15.0	B	0.98	LOS E	Y	200 75 205	200 (WBLTR) 100 (NBL) 225 (NBTR)
07	6th St. @ Washington St.	Overall Intersection	11.8	B	0.48	LOS E	Y	-	-	Overall Intersection	14.6	B	0.29	LOS E	Y	-	-	Overall Intersection	14.6	14.6	B	0.29	LOS E	Y	-	-
08	6th St. @ Main St.	Overall Intersection	7.6	A	0.53	LOS E	Y	-	-	Overall Intersection	8.6	A	0.79	LOS E	Y	75 185	100 (NBL) 200 (NBTR)	Overall Intersection	8.6	8.6	A	0.79	LOS E	Y	75 185	100 (NBL) 200 (NBTR)
09	6th St. @ Broadway	Southbound Right	4.7	A	0.36	LOS E	Y	-	-	Eastbound Left/Thru	1.7	A	0.25	LOS E	Y	-	-	Eastbound Left/Thru	1.7	1.7	A	0.25	LOS E	Y	-	-
10	6th St. @ C St.	Northbound Left/Thru	16.7	C	-	LOS E	Y	850	850 (NBLT)	Southbound Thru	3.7	A	0.36	LOS E	Y	-	-	Southbound Thru	3.7	3.7	A	0.36	LOS E	Y	-	-
11	8th St. @ Esther St.	Southbound Left/Thru/Right	8.8	A	0.19	LOS E	Y	-	-	Northbound Left/Thru/Right	7.3	A	0.27	LOS E	Y	-	-	Northbound Left/Thru/Right	7.3	7.3	A	0.27	LOS E	Y	-	-
12	8th St. @ Columbia St.	Overall Intersection	12.2	B	0.85	LOS E	Y	-	-	Overall Intersection	15.4	B	0.68	LOS E	Y	75 75 210	125 (SBL) 100 (WBL) 225 (WBTR)	Overall Intersection	15.4	15.4	B	0.68	LOS E	Y	75 75 210	125 (SBL) 100 (WBL) 225 (WBTR)
13	8th St. @ Washington St.	Overall Intersection	11.5	B	0.59	LOS E	Y	-	-	Overall Intersection	11.9	B	0.54	LOS E	Y	-	-	Overall Intersection	11.9	11.9	B	0.54	LOS E	Y	-	-
14	8th St. @ Main St.	Overall Intersection	12.2	B	0.58	LOS E	Y	-	-	Overall Intersection	15.2	B	0.63	LOS E	Y	-	-	Overall Intersection	15.2	15.2	B	0.63	LOS E	Y	-	-
15	8th St. @ Broadway	Southbound Left/Thru/Right	10.3	B	0.65	LOS E	Y	-	-	Overall Intersection	7.0	A	0.63	LOS E	Y	-	-	Overall Intersection	7.0	7.0	A	0.63	LOS E	Y	-	-
16	8th St. @ C St.	Overall Intersection	16.2	B	0.58	LOS E	Y	-	-	Overall Intersection	11.2	B	0.52	LOS E	Y	-	-	Overall Intersection	11.2	11.2	B	0.52	LOS E	Y	-	-
17	9th St. @ Esther St.	Westbound Left/Thru/Right	4.2	A	6.00	LOS E	Y	-	-	Westbound Left/Thru/Right	5.9	A	0.07	LOS E	Y	-	-	Westbound Left/Thru/Right	5.9	5.9	A	0.07	LOS E	Y	-	-
18	9th St. @ Columbia St.	Westbound Left/Thru/Right	7.0	A	0.13	LOS E	Y	-	-	Westbound Left/Thru/Right	6.2	A	0.08	LOS E	Y	-	-	Westbound Left/Thru/Right	6.2	6.2	A	0.08	LOS E	Y	-	-
19	9th St. @ Washington St.	Westbound Left	5.4	A	0.04	LOS E	Y	-	-	Overall Intersection	8.0	A	0.44	LOS E	Y	-	-	Overall Intersection	8.0	8.0	A	0.44	LOS E	Y	-	-
20	9th St. @ Main St.	Eastbound Left/Thru/Right	4.6	A	0.06	LOS E	Y	-	-	Eastbound Left/Thru/Right	7.9	A	0.17	LOS E	Y	-	-	Eastbound Left/Thru/Right	7.9	7.9	A	0.17	LOS E	Y	-	-
21	9th St. @ Broadway	Eastbound Left/Right	3.9	A	0.04	LOS E	Y	-	-	Overall Intersection	3.6	A	0.35	LOS E	Y	-	-	Overall Intersection	3.6	3.6	A	0.35	LOS E	Y	-	-
22	Evergreen Blvd. @ Esther St.	Northbound Left/Thru/Right	7.6	A	0.12	LOS E	Y	-	-	Northbound Left/Thru/Right	10.5	B	0.23	LOS E	Y	-	-	Northbound Left/Thru/Right	10.5	10.5	B	0.23	LOS E	Y	-	-
23	Evergreen Blvd. @ Columbia St.	Overall Intersection	13.0	B	0.63	LOS E	Y	-	-	Overall Intersection	19.4	B	0.75	LOS E	Y	225 100 205	225 (WBTR) 125 (NBL) 225 (SBTR)	Overall Intersection	19.4	19.4	B	0.75	LOS E	Y	225 100 205	225 (WBTR) 125 (NBL) 225 (SBTR)
24	Evergreen Blvd. @ Washington St.	Overall Intersection	17.2	B	0.60	LOS E	Y	75	100 (WBL)	Overall Intersection	11.8	B	0.56	LOS E	Y	210	225 (SBTR)	Overall Intersection	11.8	11.8	B	0.56	LOS E	Y	210	225 (SBTR)
25	Evergreen Blvd. @ Main St.	Overall Intersection	14.8	B	0.68	LOS E	Y	-	-	Overall Intersection	10.4	B	0.65	LOS E	Y	-	-	Overall Intersection	10.4	10.4	B	0.65	LOS E	Y	-	-
26	Evergreen Blvd. @ Broadway	Overall Intersection	14.9	B	0.70	LOS E	Y	75 210	125 (WBL) 225 (WBTR)	Overall Intersection	10.3	B	0.52	LOS E	Y	-	-	Overall Intersection	10.3	10.3	B	0.52	LOS E	Y	-	-
27	Evergreen Blvd. @ C St.	Overall Intersection	14.3	B	0.64	LOS E	Y	-	-	Overall Intersection	11.5	B	0.68	LOS E	Y	-	-	Overall Intersection	11.5	11.5	B	0.68	LOS E	Y	-	-
28	11th St. @ Esther St.	Southbound Left/Thru/Right	4.6	A	0.05	LOS E	Y	-	-	Northbound Left/Thru/Right	4.8	A	0.14	LOS E	Y	-	-	Northbound Left/Thru/Right	4.8	4.8	A	0.14	LOS E	Y	-	-
29	11th St. @ Columbia St.	Westbound Left/Thru/Right	8.1	A	0.29	LOS E	Y	-	-	Eastbound Left/Thru/Right	15.6	C	0.25	LOS E	Y	-	-	Eastbound Left/Thru/Right	15.6	15.6	C	0.25	LOS E	Y	-	-
30	11th St. @ Washington St.	Westbound Left/Thru	7.9	A	0.23	LOS E	Y	-	-	Overall Intersection	10.1	B	0.46	LOS E	Y	-	-	Overall Intersection	10.1	10.1	B	0.46	LOS E	Y	-	-
31	11th St. @ Main St.	Westbound Left/Thru/Right	6.3	A	0.16	LOS E	Y	-	-	Westbound Left/Thru/Right	10.5	B	0.19	LOS E	Y	-	-	Westbound Left/Thru/Right	10.5	10.5	B	0.19	LOS E	Y	-	-
32	11th St. @ Broadway	Westbound Left/Thru/Right	6.9	A	0.22	LOS E	Y	-	-	Overall Intersection	10.1	B	0.40	LOS E	Y	-	-	Overall Intersection	10.1	10.1	B	0.40	LOS E	Y	-	-
33	11th St. @ C St.	Eastbound Left/Thru	6.3	A	0.17	LOS E	Y	-	-	Eastbound Left/Thru/Right	6.7	A	0.14	LOS E	Y	-	-	Eastbound Left/Thru/Right	6.7	6.7	A	0.14	LOS E	Y	-	-
34	Mill Plain Blvd. @ Columbia St.	Overall Intersection	18.4	B	0.77	LOS E	Y	75 210	150 (SBL) 225 (SBT)	Overall Intersection	15.4	B	1.06	LOS E	Y	75 210	150 (SBL) 225 (SBT)	Overall Intersection	15.4	15.4	B	1.06	LOS E	Y	75 210	150 (SBL) 225 (SBT)
35	Mill Plain Blvd. @ Washington St.	Overall Intersection	7.0	A	0.43	LOS E	Y	-	-	Overall Intersection	17.7	B	0.50	LOS E	Y	205	225 (SBLT)	Overall Intersection	17.7	17.7	B	0.50	LOS E	Y	205	225 (SBLT)
36	Mill Plain Blvd. @ Main St.	Overall Intersection	11.5	B	1.01	LOS E	Y	70	150 (SBL)	Overall Intersection	14.3	B	1.09	LOS E	Y	70 210	150 (SBL) 225 (SBT)	Overall Intersection	14.3	14.3	B	1.09	LOS E	Y	70 210	150 (SBL) 225 (SBT)
37	Mill Plain Blvd. @ Broadway	Overall Intersection	10.3	B	0.68	LOS E	Y	70	150 (SBL)	Overall Intersection	9.4	A	0.38	LOS E	Y	-	-	Overall Intersection	9.4	9.4	A	0.38	LOS E	Y	-	-
38	Mill Plain Blvd. @ C St.	Overall Intersection	8.0	A	0.38	LOS E	Y	-	-	Overall Intersection	12.8	B	1.02	LOS E	Y	200 75 200	200 (EBLTR) 125 (SBL) 200 (SBT)	Overall Intersection	12.8	12.8	B	1.02	LOS E	Y	200 75 200	200 (EBLTR) 125 (SBL) 200 (SBT)
39	Mill Plain Blvd. @ I-5 SB On-/Off-Ramps	Overall Intersection	20.4	C	0.75	LOS E	Y	800 350 275	800 (EBT) 500 (EBR) 350 (WBL)																	
FF	Mill Plain Blvd. @ I-5 SPUI									Overall Intersection	22.1	C	0.63	LOS E	Y	-	-	Overall Intersection	22.1	22.1	C	0.63	LOS E	Y	-	-
40	Mill Plain Blvd. @ I-5 NB On-/Off-Ramps	Overall Intersection	36.0	D	0.88	LOS E	Y	590 325	600 (NBLT) 500 (NBR)																	
41	15th St. @ Columbia St.	Overall Intersection	17.4	B	0.77	LOS E	Y	220	225 (WBLT)	Overall Intersection	22.5	C	1.06	LOS E	Y	225 75	225 (WBLTR) 75 (NBL)	Overall Intersection	22.5	22.5	C	1.06	LOS E	Y	225 75	225 (WBLTR) 75 (NBL)
42	15th St. @ Washington St.	Overall Intersection	12.3	B	0.54	LOS E	Y	210 210	250 (WBL) 225 (WBT)	Overall Intersection	7.4	A	0.56	LOS E	Y	70	75 (WBT)	Overall Intersection	7.4	7.4	A	0.56	LOS E	Y	70	75 (WBT)
GG	15th St. @ Mill District Park & Ride									Westbound Thru/Right	2.1	A	0.41	LOS E	Y	90	100 (WBTR)	Westbound Thru/Right	2.1	2.1	A	0.41	LOS E	Y	90	100 (WBTR)
43	15th St. @ Main St.	Overall Intersection	14.7	B	1.01	LOS E	Y	195	200 (WBLT)	Overall Intersection	24.2	C	1.09	LOS E	Y	190 225	200 (WBT) 225 (SBTR)	Overall Intersection	24.2	24.2	C	1.09	LOS E	Y	190 225	200 (WBT) 225 (SBTR)
44	15th St. @ Broadway	Overall Intersection	14.2	B	0.68	LOS E	Y	205	225 (WBLT)	Overall Intersection	11.0	B	0.59	LOS E	Y	200	200 (WBTR)	Overall Intersection	11.0	11.0	B	0.59	LOS E	Y	200	200 (WBTR)
45	15th St. @ C St.	Overall Intersection	8.3	A	0.58	LOS E	Y	-	-	Overall Intersection	47.1	D	1.02	LOS E	Y	-	-	Overall Intersection	47.1	47.1	D	1.02	LOS E	Y	-	-
D	16th St. @ Washington St.	Westbound Left/Thru	6.1	A	0.18	LOS E	Y	-	-	Overall Intersection	21.6	C	0.30	LOS E	Y	65	75 (WBLTR)	Overall Intersection	21.6	21.6	C	0.30	LOS E	Y	65	75 (WBLTR)
HH	16th St. @ Mill District Park & Ride									Northbound Right	2.5	A	0.03	LOS E	Y	-	-	Northbound Right	2.5	2.5	A	0.03	LOS E	Y	-	-
E	16th St. @ Main St.	Eastbound Left/Thru/Right	9.6	A	0.17	LOS E	Y	-	-	Overall Intersection	12.8	B	0.49	LOS E	Y	180	200 (SBLTR)	Overall Intersection	12.8	12.8	B	0.49	LOS E	Y	180	200 (SBLTR)
F	17th Street & Washington	Westbound Left/Thru	6.6	A	0.14	LOS E	Y	-	-	Overall Intersection	8.6	A	0.27	LOS E	Y	-	-	Overall Intersection	8.6	8.6	A	0.27	LOS E	Y	-	-
G	17th Street & Main	Eastbound Thru/Right	10.5	B	0.14	LOS E	Y	-	-	Overall Intersection	4.1	A	0.50	LOS E	Y	-	-	Overall Intersection	4.1	4.1	A	0.50	LOS E	Y	-	-
H	17th Street & Broadway	Westbound Left/Thru/Right	9.5	A	0.11	LOS E	Y	-	-	Overall Intersection	9.2	A	0.15	LOS E	Y	-	-	Overall Intersection	9.2	9.2	A	0.15	LOS E	Y	-	-
I	17th Street & C Street	Eastbound Left/Thru	5.7	A	0.09	LOS E	Y	-	-	Overall Intersection	8.0	A	0.23	LOS E	Y	-	-	Overall Intersection	8.0	8.0	A	0.23	LOS E	Y	-	-
J	17th Street & G Street	Eastbound Left/Thru/Right	2.7	A	0.04	LOS E	Y	-	-	Overall Intersection	6.0	A	0.13	LOS E	Y	-	-	Overall Intersection	6.0	6.0	A	0.13	LOS E	Y	-	-
46	McLoughlin Blvd. @ Columbia St.	Overall Intersection	12.2	B	0.64	LOS E	Y	-	-	Overall Intersection	11.8	B	0.65	LOS E	Y	-	-	Overall Intersection	11.8	11.8	B	0.65	LOS E	Y	-	-
K	McLoughlin Blvd. @ Washington St.	Overall Intersection	5.5	A	0.39	LOS E	Y	-	-	Overall Intersection	9.1	A	0.52	LOS E	Y	-	-	Overall Intersection	9.1	9.1	A	0.52	LOS E	Y	-	-
47	McLoughlin Blvd. @ Main St.	Overall Intersection	16.1	B	0.70	LOS E	Y	-	-	Overall Intersection	21.2	C	0.83	LOS E	Y	220 50	225 (WBLTR) 100 (SBR)	Overall Intersection	21.2	21.2	C	0.83	LOS E	Y	220 50	225 (WBLTR) 100 (SBR)
48	McLoughlin Blvd. @ Broadway	Overall Intersection	18.0	B	0.59	LOS E	Y	75	100 (WBL)	Overall Intersection	23.7	C	0.54	LOS E	Y	200	200 (WBT)	Overall Intersection	23.7	23.7	C	0.54	LOS E	Y	200	200 (WBT)
L	McLoughlin Blvd. @ C St.	Overall Intersection	5.9	A	0.30	LOS E	Y	-	-	Overall Intersection	11.3	B	0.49	LOS E	Y	-	-	Overall Intersection	11.3	11.3	B	0.49	LOS E	Y	-	-
M	McLoughlin Blvd. @ G St.	Northbound Left/Thru/Right	6.2	A	-	LOS E	Y	-	-	Southbound Left/Thru/Right	5.5	A	-	LOS E	Y	-	-	Southbound Left/Thru/Right	5.5	5.5	A	-	LOS E	Y	-	-
II	McLoughlin Blvd. @ Clark College Park & Ride									Overall Intersection	10.3	B	0.33	LOS D	Y	-	-	Overall Intersection	10.3	10.3	B	0.33	LOS D	Y	-	-
JJ	McLoughlin Blvd. @ Marshall CC East									Overall Intersection	1.9	A	0.30	LOS D	Y	-	-	Overall Intersection	1.9	1.9	A	0.30	LOS D	Y	-	-
49	McLoughlin Blvd. @ Fort Vancouver Way	Overall Intersection	11.7	B	0.42	LOS D	Y	-	-	Overall Intersection	15.4	B	0.55	LOS D	Y	-	-	Overall Intersection	15.4	15.4	B	0.55	LOS D	Y	-	-

Continued on next page

Exhibit 7-31

Vancouver Intersection Performance Results

AM Peak Hour

2030 No-Build

#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)
50	24th St. @ Columbia St.	Eastbound Left/Thru/Right	9.0	A	0.04	LOS E	Y	-	-
51	24th St. @ Main St.	Eastbound Left/Right	9.8	A	0.05	LOS E	Y	-	-
52	4th Plain Blvd. @ Columbia St.	***Overall Intersection***	20.4	C	0.74	LOS D	Y	235	250 (SBTR)
53	4th Plain Blvd. @ Main St.	***Overall Intersection***	36.1	D	0.76	LOS D	Y	170 195 75 470	200 (WBL) 200 (WBT) 125 (SBL) 475 (SBTR)
54	4th Plain Blvd. @ Broadway	***Overall Intersection***	> 100	F	0.67	LOS D	N	195 495	200 (EBLT) 500 (WBT)
55	4th Plain Blvd. @ F St.	***Overall Intersection***	11.2	B	0.53	LOS D	Y	150	150 (EBT)
56	4th Plain Blvd. @ I-5 SB On-/Off-Ramps	***Overall Intersection***	17.5	B	0.64	LOS D	Y	200	275 (EBL)
57	4th Plain Blvd. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	16.2	B	0.58	LOS D	Y	75	125 (WBR)
58	4th Plain Blvd. @ Post Cemetery	Eastbound Left	7.4	A	0.00	LOS E	Y	-	-
59	4th Plain Blvd. @ St. Johns Blvd.	***Overall Intersection***	16.8	B	0.42	LOS D	Y	-	-
60	28th St. @ Main St.	Eastbound Left/Thru/Right	> 100	F	0.10	LOS E	N	215	225 (SBTR)
61	28th St. @ Broadway	Westbound Left	5.4	A	0.24	LOS E	Y	-	-
62	29th St. @ Main St./Broadway	Westbound Left/Thru/Right	74.8	F	-	LOS E	N	1000	1000 (SBTR)
63	33rd St. @ Main St.	***Overall Intersection***	34.8	C	0.70	LOS D	Y	50 50 75	50 (EBL) 75 (WBL) 100 (NBL)
64	39th St. @ Main St.	***Overall Intersection***	> 100	F	0.93	LOS D	N	75 1310 75 215 75 125 360	125 (EBL) 1325 (EBTR) 125 (WBL) 225 (WBTR) 125 (NBL) 200 (SBL) 375 (SBT)
65	39th St. @ F St.	Northbound Left/Thru/Right	> 100	F	0.12	LOS E	N	50 430	75 (WBL) 450 (WBTR)
66	39th St. @ H St.	***Overall Intersection***	26.0	C	0.66	LOS D	Y	135	150 (WBTR)
67	39th St. @ I-5 SB On-/Off-Ramps	***Overall Intersection***	64.4	E	0.60	LOS D	N	135 55 275 715 1660 125	150 (EBT) 100 (EBR) 375 (WBL) 725 (WBT) 1675 (NBL) 275 (NBR)
68	39th St. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	> 100	F	0.80	LOS D	N	300 715 1170 790 75	325 (EBL) 725 (EBT) 1175 (WBTR) 800 (NBLT) 75 (NBR)
69	WSDOT/40th St. @ Main St.	***Overall Intersection***	21.5	C	0.57	LOS D	Y	-	-
70	45th St. @ Main St.	***Overall Intersection***	9.4	A	0.64	LOS D	Y	-	-
71	Hazel Dell @ Main St. (West)	***Overall Intersection***	13.9	B	0.71	LOS D	Y	-	-
72	Ross St. @ Main St.	***Overall Intersection***	6.7	A	0.47	LOS D	Y	60	75 (WBL)
73	Ross St. @ North Rd.	Northbound Left/Thru	7.2	A	0.39	LOS E	Y	-	-

2030 LPA with Highway Phasing (Broadway-Washington/17th)

#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)
50	24th St. @ Columbia St.	Eastbound Left/Thru/Right	7.9	A	0.03	LOS E	Y	-	-
51	24th St. @ Main St.	Eastbound Left/Right	7.8	A	0.04	LOS E	Y	-	-
52	4th Plain Blvd. @ Columbia St.	***Overall Intersection***	16.5	B	0.64	LOS D	Y	235	250 (SBTR)
53	4th Plain Blvd. @ Main St.	***Overall Intersection***	49.5	D	0.72	LOS D	Y	170 195 75 75 470	225 (WBL) 200 (WBTR) 75 (NBR) 125 (SBL) 475 (SBTR)
54	4th Plain Blvd. @ Broadway	***Overall Intersection***	42.9	D	0.60	LOS D	Y	495 195	500 (WBTR) 200 (SBLTR)
55	4th Plain Blvd. @ F St.	***Overall Intersection***	10.0	A	0.55	LOS D	Y	150	150 (EBT)
56	4th Plain Blvd. @ I-5 SB On-/Off-Ramps	***Overall Intersection***	21.9	C	0.58	LOS D	Y	200	250 (EBL)
57	4th Plain Blvd. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	19.9	B	0.51	LOS D	Y	-	-
58	4th Plain Blvd. @ Post Cemetery	Eastbound Left	6.7	A	0.01	LOS E	Y	-	-
59	4th Plain Blvd. @ St. Johns Blvd.	***Overall Intersection***	17.5	B	0.43	LOS D	Y	-	-
60	28th St. @ Main St.	Eastbound Left/Thru/Right	> 100	F	0.23	LOS E	Y**	325 215	325 (EBLTR) 225 (SBTR)
61	28th St. @ Broadway	Westbound Left	4.2	A	0.11	LOS E	Y	-	-
62	29th St. @ Main St./Broadway	Westbound Left/Thru/Right	> 100	F	-	LOS E	N	1050	1050 (SBTR)
63	33rd St. @ Main St.	***Overall Intersection***	15.2	B	0.57	LOS D	Y	50	75 (WBL)
64	39th St. @ Main St.	***Overall Intersection***	> 100	F	0.96	LOS D	Y**	75 1310 75 215 75 125 360	175 (EBL) 1325 (EBTR) 250 (WBL) 225 (WBTR) 125 (NBL) 225 (SBL) 375 (SBTR)
65	39th St. @ F St.	Westbound Thru/Right	33.9	D	0.57	LOS E	Y	215 435	225 (EBTR) 450 (WBTR)
66	39th St. @ H St.	***Overall Intersection***	69.4	E	0.79	LOS D	N	430 135	450 (EBTR) 150 (WBTR)
67	39th St. @ I-5 SB On-/Off-Ramps	***Overall Intersection***	30.2	C	0.96	LOS D	Y	135 55 730 130	150 (EBT) 125 (EBR) 750 (WBT) 225 (NBLR)
68	39th St. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	> 100	F	1.05	LOS D	Y**	300 1175 790	375 (EBL) 1175 (WBT) 925 (NBL)
69	WSDOT/40th St. @ Main St.	***Overall Intersection***	40.6	D	0.47	LOS D	Y	150	200 (SBL)
70	45th St. @ Main St.	***Overall Intersection***	19.4	B	0.54	LOS D	Y	-	-
71	Hazel Dell @ Main St. (West)	***Overall Intersection***	11.8	B	0.61	LOS D	Y	205	225 (SBLT)
72	Ross St. @ Main St.	***Overall Intersection***	8.6	A	0.52	LOS D	Y	60	75 (WBL)
73	Ross St. @ North Rd.	Northbound Left/Thru	7.7	A	0.41	LOS E	Y	-	-

2030 LPA (Broadway-Washington/17th)

#	Intersection	Approach/Movement	Delay (Seconds)	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)
50	24th St. @ Columbia St.	Eastbound Left/Thru/Right	7.9	7.9	A	0.03	LOS E	Y	-	-
51	24th St. @ Main St.	Eastbound Left/Right	7.8	7.8	A	0.04	LOS E	Y	-	-
52	4th Plain Blvd. @ Columbia St.	***Overall Intersection***	16.5	16.5	B	0.64	LOS D	Y	235	250 (SBTR)
53	4th Plain Blvd. @ Main St.	***Overall Intersection***	49.5	49.5	D	0.72	LOS D	Y	170 195 75 75 470	225 (WBL) 200 (WBTR) 75 (NBR) 125 (SBL) 475 (SBTR)
54	4th Plain Blvd. @ Broadway	***Overall Intersection***	42.9	42.9	D	0.60	LOS D	Y	495 195	500 (WBTR) 200 (SBLTR)
55	4th Plain Blvd. @ F St.	***Overall Intersection***	10.0	10.0	A	0.55	LOS D	Y	150	150 (EBT)
56	4th Plain Blvd. @ I-5 SB On-/Off-Ramps	***Overall Intersection***	21.9	21.9	C	0.58	LOS D	Y	200	250 (EBL)
57	4th Plain Blvd. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	19.9	19.9	B	0.51	LOS D	Y	-	-
58	4th Plain Blvd. @ Post Cemetery	Eastbound Left	6.7	6.7	A	0.01	LOS E	Y	-	-
59	4th Plain Blvd. @ St. Johns Blvd.	***Overall Intersection***	17.5	17.5	B	0.43	LOS D	Y	-	-
60	28th St. @ Main St.	Eastbound Left/Thru/Right	520.0	> 100	F	0.23	LOS E	Y**	325 215	325 (EBLTR) 225 (SBTR)
61	28th St. @ Broadway	Westbound Left	4.2	4.2	A	0.11	LOS E	Y	-	-
62	29th St. @ Main St./Broadway	Westbound Left/Thru/Right	264.8	> 100	F	-	LOS E	N	1050	1050 (SBTR)
63	33rd St. @ Main St.	***Overall Intersection***	21.6	21.6	C	0.57	LOS D	Y	50	75 (WBL)
64	39th St. @ Main St.	***Overall Intersection***	76.9	76.9	E	0.90	LOS D	Y*	75 1310 75 215 75 125 360	175 (EBL) 1325 (EBTR) 225 (WBL) 225 (WBTR) 125 (NBL) 200 (SBL) 350 (SBT)
65	39th St. @ F St.	Westbound Thru/Right	33.3	33.3	D	0.56	LOS E	Y	435	450 (WBTR)
66	39th St. @ H St.	***Overall Intersection***	18.4	18.4	B	0.78	LOS D	Y	135	150 (WBTR)
67	39th St. @ I-5 SB On-/Off-Ramps	Westbound Thru	36.7	36.7	E	0.64	LOS E	Y	55 730	100 (EBR) 750 (WBT)
68	39th St. @ I-5 NB On-/Off-Ramps	***Overall Intersection***	72.8	72.8	E	0.72	LOS D	Y*	1175 790	1175 (WBT) 800 (NBL)
69	WSDOT/40th St. @ Main St.	***Overall Intersection***	29.3	29.3	C	0.47	LOS D	Y	150	175 (SBL)
70	45th St. @ Main St.	***Overall Intersection***	11.6	11.6	B	0.54	LOS D	Y	-	-
71	Hazel Dell @ Main St. (West)	***Overall Intersection***	11.5	11.5	B	0.61	LOS D	Y	205	225 (SBLT)
72	Ross St. @ Main St.	***Overall Intersection***	8.4	8.4	A	0.52	LOS D	Y	60	75 (WBL)
73	Ross St. @ North Rd.	Northbound Left/Thru	7.0	7.0	A	0.41	LOS E	Y	-	-

Delay / LOS affected by freeway congestion
Intersection queuing spills back into upstream intersection
Note 1 The ICU is used for overall intersections (signalized and unsignalized). The V/C is used for the identified movement(s) at unsignalized intersections.
Note 2 The 2003 Vancouver Concurrency Administration Manual designates an acceptable LOS standard of LOS E for downtown and LOS D for all other intersections.
Note 3 2030 LPA and LPA Phase I Roundabout intersection operations taken from VISSIM analysis
* Intersection not modeled in existing conditions scenario
Y* Intersection does not meet standard in the Build scenario, but meets the "do no worse" criteria as compared to the No Build.
Y** Intersection operations are no worse than No Build, and no mitigation is required.

Exhibit 7-32

Vancouver Intersection Performance Results

PM Peak Hour		2030 No-Build								2030 LPA with Highway Phasing (Broadway-Washington/17th)								2030 LPA (Broadway-Washington/17th)								
#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)	Approach/Movement	Delay (Seconds)	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)
A	Esther St. @ Columbia Way	Eastbound Left	6.2	A	0.08	LOS E	Y	-	-	Southbound Left/Right	8.7	A	0.42	LOS E	Y	-	-	Southbound Left/Right	8.7	8.7	A	0.42	LOS E	Y	-	-
B	Columbia St. @ Columbia Way[3]	Eastbound Left	6.0	A	0.07	LOS E	Y	-	-	Southbound Left/Right	2.2	A	0.40	LOS E	Y	-	-	Southbound Left/Right	2.2	2.2	A	0.40	LOS E	Y	-	-
AA	Main St. @ Columbia Way[3]									Eastbound Left/Thru	1.2	A	0.20	LOS E	Y	-	-	Eastbound Left/Thru	1.2	1.2	A	0.20	LOS E	Y	-	-
01	3rd/4th St. @ Columbia St[3]	Eastbound Left/Right	6.7	A	0.16	LOS E	Y	-	-	Southbound Left/Thru/Right	4.9	A	0.73	LOS E	Y	-	-	Southbound Left/Thru/Right	4.9	4.9	A	0.73	LOS E	Y	-	-
BB	SR 14 and Main Street[3]									Eastbound Left/Thru/Right	14.1	B	0.79	LOS E	Y	-	-	Eastbound Left/Thru/Right	14.1	14.1	B	0.79	LOS E	Y	-	-
CC	SR 14 Park and Ride @ Main Street									Eastbound Left/Right	8.2	A	0.03	LOS E	Y	-	-	Eastbound Left/Right	8.2	8.2	A	0.03	LOS E	Y	-	-
C	3rd/4th St. @ Esther St.	Westbound Left/Right	3.1	A	0.01	LOS E	Y	-	-	Westbound Left/Right	6.0	A	0.13	LOS E	Y	-	-	Westbound Left/Right	6.0	6.0	A	0.13	LOS E	Y	-	-
02	4th St. @ Columbia St.	Northbound Thru/Right	0.4	A	0.21	LOS E	Y	-	-																	
03	4th St. @ Washington St.	Eastbound Right	2.7	A	0.01	LOS E	Y	-	-																	
04	5th St. @ Columbia St.	Southbound Left	9.1	A	0.41	LOS E	Y	90	125 (SBL)	Westbound Left/Right	3.6	A	0.04	LOS E	Y	-	-	Westbound Left/Right	3.6	3.6	A	0.04	LOS E	Y	-	-
DD	5th St. @ Columbia Park and Ride									Northbound Left/Right	3.9	A	0.23	LOS E	Y	-	-	Northbound Left/Right	3.9	3.9	A	0.23	LOS E	Y	-	-
05	5th St. @ Washington St.	*Overall Intersection*	13.4	B	0.54	LOS E	Y	180 210	200 (EBR to SR-14) 225 (SBT)	*Overall Intersection*	9.7	A	0.32	LOS E	Y	85	100 (EBTR)	*Overall Intersection*	9.7	9.7	A	0.32	LOS E	Y	85	100 (EBTR)
EE	5th St. @ Main St.									*Overall Intersection*	12.7	B	0.60	LOS E	Y	175	175 (SBTR)	*Overall Intersection*	12.7	12.7	B	0.60	LOS E	Y	175	175 (SBTR)
06	6th St. @ Columbia St.	*Overall Intersection*	13.1	B	0.69	LOS E	Y	-	-	*Overall Intersection*	22.2	C	0.85	LOS E	Y	200 205 75	200 (WBLTR) 225 (NBTR) 75 (SBL)	*Overall Intersection*	22.2	22.2	C	0.85	LOS E	Y	200 205 75	200 (WBLTR) 225 (NBTR) 75 (SBL)
07	6th St. @ Washington St.	*Overall Intersection*	15.2	B	0.57	LOS E	Y	-	-	*Overall Intersection*	4.7	A	0.33	LOS E	Y	-	-	*Overall Intersection*	4.7	4.7	A	0.33	LOS E	Y	-	-
08	6th St. @ Main St.	*Overall Intersection*	6.5	A	0.60	LOS E	Y	-	-	*Overall Intersection*	14.4	B	0.70	LOS E	Y	165 220	175 (NBLTR) 225 (SBLTR)	*Overall Intersection*	14.4	14.4	B	0.70	LOS E	Y	165 220	175 (NBLTR) 225 (SBLTR)
09	6th St. @ Broadway	Southbound Right	4.7	A	0.22	LOS E	Y	-	-	Eastbound Left/Thru	2.0	A	0.21	LOS E	Y	-	-	Eastbound Left/Thru	2.0	2.0	A	0.21	LOS E	Y	-	-
10	6th St. @ C St.	Northbound Left/Thru	2.9	A	0.30	LOS E	Y	-	-	Southbound Thru	5.8	A	0.84	LOS E	Y	-	-	Southbound Thru	5.8	5.8	A	0.84	LOS E	Y	-	-
11	8th St. @ Esther St.	Northbound Left/Thru/Right	14.6	B	0.50	LOS E	Y	-	-	Northbound Left/Thru/Right	14.3	B	0.35	LOS E	Y	-	-	Northbound Left/Thru/Right	14.3	14.3	B	0.35	LOS E	Y	-	-
12	8th St. @ Columbia St.	*Overall Intersection*	21.6	C	1.10	LOS E	Y	215	225 (SBLTR)	*Overall Intersection*	30.2	C	0.75	LOS E	Y	150 75 75	200 (EBL) 125 (WBL) 125 (SBL)	*Overall Intersection*	30.2	30.2	C	0.75	LOS E	Y	150 75 75	200 (EBL) 125 (WBL) 125 (SBL)
13	8th St. @ Washington St.	*Overall Intersection*	10.2	B	0.56	LOS E	Y	-	-	*Overall Intersection*	12.8	B	0.56	LOS E	Y	-	-	*Overall Intersection*	12.8	12.8	B	0.56	LOS E	Y	-	-
14	8th St. @ Main St.	*Overall Intersection*	13.5	B	0.58	LOS E	Y	-	-	*Overall Intersection*	24.2	C	0.74	LOS E	Y	75 200 75 215 215	125 (EBL) 200 (EBTR) 125 (WBL) 225 (NBLTR) 225 (SBLTR)	*Overall Intersection*	24.2	24.2	C	0.74	LOS E	Y	75 200 75 215 215	125 (EBL) 200 (EBTR) 125 (WBL) 225 (NBLTR) 225 (SBLTR)
15	8th St. @ Broadway	Southbound Left/Thru/Right	8.1	A	0.38	LOS E	Y	-	-	*Overall Intersection*	23.0	C	0.64	LOS E	Y	-	-	*Overall Intersection*	23.0	23.0	C	0.64	LOS E	Y	-	-
16	8th St. @ C St.	*Overall Intersection*	15.3	B	0.42	LOS E	Y	-	-	*Overall Intersection*	12.3	B	0.70	LOS E	Y	-	-	*Overall Intersection*	12.3	12.3	B	0.70	LOS E	Y	-	-
17	9th St. @ Esther St.	Eastbound Left/Thru/Right	3.7	A	0.02	LOS E	Y	-	-	Westbound Left/Thru/Right	5.1	A	0.06	LOS E	Y	-	-	Westbound Left/Thru/Right	5.1	5.1	A	0.06	LOS E	Y	-	-
18	9th St. @ Columbia St.	Eastbound Left/Thru/Right	13.8	B	0.14	LOS E	Y	-	-	Eastbound Left/Thru/Right	15.9	C	0.34	LOS E	Y	-	-	Eastbound Left/Thru/Right	15.9	15.9	C	0.34	LOS E	Y	-	-
19	9th St. @ Washington St.	Westbound Thru	7.2	A	0.08	LOS E	Y	-	-	*Overall Intersection*	11.2	B	0.40	LOS E	Y	-	-	*Overall Intersection*	11.2	11.2	B	0.40	LOS E	Y	-	-
20	9th St. @ Main St.	Eastbound Left/Thru/Right	6.0	A	0.06	LOS E	Y	-	-	Eastbound Left/Thru/Right	18.0	C	0.36	LOS E	Y	-	-	Eastbound Left/Thru/Right	18.0	18.0	C	0.36	LOS E	Y	-	-
21	9th St. @ Broadway	Eastbound Left/Right	4.0	A	0.04	LOS E	Y	-	-	*Overall Intersection*	26.7	C	0.37	LOS E	Y	-	-	*Overall Intersection*	26.7	26.7	C	0.37	LOS E	Y	-	-
22	Evergreen Blvd. @ Esther St.	Southbound Left/Thru/Right	6.4	A	0.12	LOS E	Y	-	-	Northbound Left/Thru/Right	9.7	A	0.22	LOS E	Y	-	-	Northbound Left/Thru/Right	9.7	9.7	A	0.22	LOS E	Y	-	-
23	Evergreen Blvd. @ Columbia St.	*Overall Intersection*	18.4	B	0.59	LOS E	Y	225	225 (NBTR)	*Overall Intersection*	28.8	C	0.71	LOS E	Y	100 220 205	125 (EBL) 225 (NBTR) 225 (SBTR)	*Overall Intersection*	28.8	28.8	C	0.71	LOS E	Y	100 220 205	125 (EBL) 225 (NBTR) 225 (SBTR)
24	Evergreen Blvd. @ Washington St.	*Overall Intersection*	13.2	B	0.55	LOS E	Y	-	-	*Overall Intersection*	19.6	B	0.61	LOS E	Y	225 210	225 (EBTR) 225 (SBLTR)	*Overall Intersection*	19.6	19.6	B	0.61	LOS E	Y	225 210	225 (EBTR) 225 (SBLTR)
25	Evergreen Blvd. @ Main St.	*Overall Intersection*	13.1	B	0.55	LOS E	Y	-	-	*Overall Intersection*	29.3	C	0.74	LOS E	Y	75 210 75 215	125 (EBL) 300 (EBTR) 125 (WBL) 225 (NBLTR)	*Overall Intersection*	29.3	29.3	C	0.74	LOS E	Y	75 210 75 215	125 (EBL) 300 (EBTR) 125 (WBL) 225 (NBLTR)
26	Evergreen Blvd. @ Broadway	*Overall Intersection*	10.0	A	0.54	LOS E	Y	-	-	*Overall Intersection*	19.3	B	0.66	LOS E	Y	100 210 220	150 (EBL) 225 (EBTR) 225 (NBLTR)	*Overall Intersection*	19.3	19.3	B	0.66	LOS E	Y	100 210 220	150 (EBL) 225 (EBTR) 225 (NBLTR)
27	Evergreen Blvd. @ C St.	*Overall Intersection*	16.8	B	0.63	LOS E	Y	75	100 (EBL)	*Overall Intersection*	28.2	C	0.77	LOS E	Y	75 200 150 100 210	150 (EBL) 200 (EBTR) 175 (WBL) 125 (SBL) 225 (SBTR)	*Overall Intersection*	28.2	28.2	C	0.77	LOS E	Y	75 200 150 100 210	150 (EBL) 200 (EBTR) 175 (WBL) 125 (SBL) 225 (SBTR)
28	11th St. @ Esther St.	Northbound Left/Thru/Right	5.8	A	0.11	LOS E	Y	-	-	Northbound Left/Thru/Right	6.2	A	0.10	LOS E	Y	-	-	Northbound Left/Thru/Right	6.2	6.2	A	0.10	LOS E	Y	-	-
29	11th St. @ Columbia St.	Eastbound Left/Thru/Right	11.6	B	0.34	LOS E	Y	-	-	Eastbound Left/Thru/Right	12.1	B	0.38	LOS E	Y	-	-	Eastbound Left/Thru/Right	12.1	12.1	B	0.38	LOS E	Y	-	-
30	11th St. @ Washington St.	Eastbound Thru/Right	7.4	A	0.17	LOS E	Y	-	-	*Overall Intersection*	11.5	B	0.44	LOS E	Y	-	-	*Overall Intersection*	11.5	11.5	B	0.44	LOS E	Y	-	-
31	11th St. @ Main St.	Eastbound Left/Thru/Right	15.6	C	0.31	LOS E	Y	-	-	Eastbound Left/Thru/Right	12.0	B	0.50	LOS E	Y	-	-	Eastbound Left/Thru/Right	12.0	12.0	B	0.50	LOS E	Y	-	-
32	11th St. @ Broadway	Westbound Left/Thru/Right	6.7	A	0.30	LOS E	Y	-	-	*Overall Intersection*	11.7	B	0.47	LOS E	Y	-	-	*Overall Intersection*	11.7	11.7	B	0.47	LOS E	Y	-	-
33	11th St. @ C St.	Westbound Right	11.1	B	0.19	LOS E	Y	-	-	Eastbound Left/Thru/Right	21.9	C	0.24	LOS E	Y	-	-	Eastbound Left/Thru/Right	21.9	21.9	C	0.24	LOS E	Y	-	-
34	Mill Plain Blvd. @ Columbia St.	*Overall Intersection*	> 100	F	0.75	LOS E	N	810 150 75	825 (EBLTR) 225 (NBR) 100 (SBL)	*Overall Intersection*	> 100	F	1.10	LOS E	Y**	810 200 150	825 (EBLTR) 200 (NBT) 175 (NBR)	*Overall Intersection*	128.0	> 100	F	1.10	LOS E	Y**	810 200 150	825 (EBLTR) 200 (NBT) 175 (NBR)
35	Mill Plain Blvd. @ Washington St.	*Overall Intersection*	54.6	D	0.57	LOS E	Y	215	225 (EBTR)	*Overall Intersection*	46.6	D	0.61	LOS E	Y	235	250 (EBTR)	*Overall Intersection*	46.6	46.6	D	0.61	LOS E	Y	235	250 (EBTR)
36	Mill Plain Blvd. @ Main St.	*Overall Intersection*	78.5	E	0.79	LOS E	Y	210 765 70	225 (EBT) 775 (NBTR) 100 (SBL)	*Overall Intersection*	37.9	D	0.71	LOS E	Y	205 100 70	225 (EBLTR) 150 (NBR) 150 (SBL)	*Overall Intersection*	37.9	37.9	D	0.71	LOS E	Y	205 100 70	225 (EBLTR) 150 (NBR) 150 (SBL)
37	Mill Plain Blvd. @ Broadway	*Overall Intersection*	39.9	D	0.77	LOS E	Y	210 70	225 (EBT) 100 (SBL)	*Overall Intersection*	44.0	D	0.71	LOS E	Y	210 210	225 (EBLT) 225 (NBTR)	*Overall Intersection*	44.0	44.0	D	0.71	LOS E	Y	210 210	225 (EBLT) 225 (NBTR)
38	Mill Plain Blvd. @ C St.	*Overall Intersection*	51.9	D	0.78	LOS E	Y	205	225 (EBT)	*Overall Intersection*	81.4	F	1.35	LOS E	N	200 215 75 195	200 (EBLTR) 225 (NBTR) 100 (SBL) 200 (SBT)	*Overall Intersection*	81.4	81.4	F	1.35	LOS E	N	200 215 75 195	200 (EBLTR) 225 (NBTR) 100 (SBL) 200 (SBT)
39	Mill Plain Blvd. @ I-5 SB On-/Off-Ramps	*Overall Intersection*	94.4	F	0.87	LOS E	N	795 350 275 610	800 (EBT) 525 (EBR) 400 (WBL) 625 (WBT)																	
FF	Mill Plain Blvd. @ I-5 SPUI									*Overall Intersection*	63.3	E	0.99	LOS E	Y	700 700 740 200	800 (EBL) 850 (EBT) 750 (WBT) 275 (WBR)	*Overall Intersection*	63.3	63.3	E	0.99	LOS E	Y	700 700 740 200	800 (EBL) 850 (EBT) 750 (WBT) 275 (WBR)
40	Mill Plain Blvd. @ I-5 NB On-/Off-Ramps	*Overall Intersection*	36.5	D	0.97	LOS E	Y	450 75	450 (WBT) 150 (WBR)																	
41	15th St. @ Columbia St.	*Overall Intersection*	8.3	A	0.75	LOS E	Y	-	-	*Overall Intersection*	12.0	B	1.10	LOS E	Y	-	-	*Overall Intersection*	12.0	12.0	B	1.10	LOS E	Y	-	-
42	15th St. @ Washington St.	*Overall Intersection*	10.1	B	0.43	LOS E	Y	-	-	*Overall Intersection*	6.4	A	0.52	LOS E	Y	60	75 (WBT)	*Overall Intersection*	6.4	6.4	A	0.52	LOS E	Y	60	75 (WBT)
GG	15th St. @ Mill District Park & Ride									Westbound Thru/Right	0.9	A	0.34	LOS E	Y	-	-	Westbound Thru/Right	0.9	0.9	A	0.34	LOS E	Y	-	-
43	15th St. @ Main St.	*Overall Intersection*	8.8	A	0.79	LOS E	Y	-	-	*Overall Intersection*	9.5	A	0.71	LOS E	Y	70	75 (NBL)	*Overall Intersection*	9.5	9.5	A	0.71	LOS E	Y	70	75 (NBL)
44	15th St. @ Broadway	*Overall Intersection*	8.3	A	0.77	LOS E	Y	70 25	100 (NBL) 75 (SBR)	*Overall Intersection*	6.5	A	0.54	LOS E	Y	-	-	*Overall Intersection*	6.5	6.5	A	0.54	LOS E	Y	-	-

Continued on next page

Exhibit 7-32

Vancouver Intersection Performance Results

PM Peak Hour — 2030 No-Build

#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)
45	15th St. @ C St.	Overall Intersection	12.1	B	0.50	LOS E	Y	-	-
D	16th St. @ Washington St.	Westbound Left/Thru	6.1	A	0.19	LOS E	Y	-	-
HH	16th St. @ Mill District Park & Ride								
E	16th St. @ Main St.	Eastbound Left/Thru/Right	8.1	A	0.24	LOS E	Y	-	-
F	17th Street & Washington	Westbound Left/Thru	5.6	A	0.06	LOS E	Y	-	-
G	17th Street & Main	Westbound Left/Thru/Right	8.6	A	0.15	LOS E	Y	-	-
H	17th Street & Broadway	Eastbound Left/Thru/Right	7.1	A	0.14	LOS E	Y	-	-
I	17th Street & C Street	Eastbound Left/Thru	6.1	A	0.14	LOS E	Y	-	-
J	17th Street & G Street	Southbound Left/Thru/Right	3.4	A	0.03	LOS E	Y	-	-
46	McLoughlin Blvd. @ Columbia St.	Overall Intersection	12.1	B	0.61	LOS E	Y	-	-
K	McLoughlin Blvd. @ Washington St.	Overall Intersection	5.9	A	0.50	LOS E	Y	-	-
47	McLoughlin Blvd. @ Main St.	Overall Intersection	15.7	B	0.76	LOS E	Y	-	-
48	McLoughlin Blvd. @ Broadway	Overall Intersection	12.0	B	0.50	LOS E	Y	-	-
L	McLoughlin Blvd. @ C St.	Overall Intersection	9.0	A	0.30	LOS E	Y	-	-
M	McLoughlin Blvd. @ G St.	Northbound Left/Thru/Right	5.8	A	-	LOS E	Y	-	-
II	McLoughlin Blvd. @ Clark College Park & Ride								
JJ	McLoughlin Blvd. @ Marshall CC East								
49	McLoughlin Blvd. @ Fort Vancouver Way	Overall Intersection	12.5	B	0.42	LOS D	Y	-	-
50	24th St. @ Columbia St.	Eastbound Left/Thru/Right	4.2	A	0.01	LOS E	Y	-	-
51	24th St. @ Main St.	Eastbound Left/Right	46.2	E	0.07	LOS E	Y	-	-
52	4th Plain Blvd. @ Columbia St.	Overall Intersection	23.8	C	0.68	LOS D	Y	-	-
53	4th Plain Blvd. @ Main St.	Overall Intersection	39.5	D	0.78	LOS D	Y	250 495 170 195 75 425 75 75	300 (EBL) 500 (EBTR) 200 (WBL) 200 (WBT) 100 (NBL) 425 (NBT) 125 (NBR) 125 (SBL)
54	4th Plain Blvd. @ Broadway	Overall Intersection	22.4	C	0.98	LOS D	Y	195 125	200 (EBTR) 150 (WBL)
55	4th Plain Blvd. @ F St.	Overall Intersection	6.6	A	0.54	LOS D	Y	150	150 (EBT)
56	4th Plain Blvd. @ I-5 SB On-/Off-Ramps	Overall Intersection	19.8	B	0.82	LOS D	Y	200 555	275 (EBL) 575 (EBT)
57	4th Plain Blvd. @ I-5 NB On-/Off-Ramps	Overall Intersection	53.7	D	0.85	LOS D	Y	275 850 75 600	375 (EBL) 850 (EBT) 150 (WBR) 625 (NBR)
58	4th Plain Blvd. @ Post Cemetery	Eastbound Left	9.1	A	0.01	LOS E	Y	-	-
59	4th Plain Blvd. @ St. Johns Blvd.	Overall Intersection	30.6	C	0.65	LOS D	Y	170	250 (EBL)
60	28th St. @ Main St.	Eastbound Left/Thru/Right	6.3	A	0.03	LOS E	Y	-	-
61	28th St. @ Broadway	Northbound Thru/Right	2.3	A	0.30	LOS E	Y	-	-
62	29th St. @ Main St./Broadway	Westbound Left/Thru/Right	62.4	F	-	LOS E	N	-	-
63	33rd St. @ Main St.	Overall Intersection	48.6	D	0.56	LOS D	Y	50 50	100 (EBL) 100 (WBL)
64	39th St. @ Main St.	Overall Intersection	> 100	F	0.96	LOS D	N	75 1270 75 215 75 1570 125 360	125 (EBL) 1275 (EBTR) 125 (WBL) 225 (WBTR) 125 (NBL) 1575 (NBTR) 175 (SBL) 375 (SBT)
65	39th St. @ F St.	Northbound Left/Thru/Right	> 100	F	0.33	LOS E	N	215 50 430 305	225 (EBTR) 75 (WBL) 450 (WBTR) 325 (NBLR)
66	39th St. @ H St.	Overall Intersection	64.3	E	0.76	LOS D	N	430 135 310	450 (EBTR) 150 (WBTR) 325 (SBLTR)
67	39th St. @ I-5 SB On-/Off-Ramps	Overall Intersection	43.7	D	0.76	LOS D	Y	135 55 710 1660	150 (EBT) 100 (EBR) 725 (WBT) 1150 (NBR)
68	39th St. @ I-5 NB On-/Off-Ramps	Overall Intersection	> 100	F	0.91	LOS D	N	300 710 790 75	325 (EBL) 725 (EBT) 800 (NBLT) 100 (NBR)
69	WSDOT/40th St. @ Main St.	Overall Intersection	45.3	D	0.53	LOS D	Y	360	375 (NBTR)
70	45th St. @ Main St.	Overall Intersection	16.5	B	0.51	LOS D	Y	335 25	350 (NBL) 50 (NBR)
71	Hazel Dell @ Main St. (West)	Overall Intersection	20.5	C	0.58	LOS D	Y	-	-
72	Ross St. @ Main St.	Overall Intersection	13.0	B	0.63	LOS D	Y	60 60	75 (WBL) 75 (WBR)
73	Ross St. @ North Rd.	Southbound Thru/Right	23.0	C	0.32	LOS E	Y	-	-

PM Peak Hour — 2030 LPA with Highway Phasing (Broadway-Washington/17th)

#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)
45	15th St. @ C St.	Overall Intersection	> 100	F	1.35	LOS E	N	-	-
D	16th St. @ Washington St.	Overall Intersection	23.5	C	0.29	LOS E	Y	65	75 (WBLT)
HH	16th St. @ Mill District Park & Ride	Northbound Right	3.9	A	0.15	LOS E	Y	-	-
E	16th St. @ Main St.	Overall Intersection	11.2	B	0.61	LOS E	Y	85	100 (EBLTR)
F	17th Street & Washington	Overall Intersection	10.4	B	0.26	LOS E	Y	-	-
G	17th Street & Main	Overall Intersection	8.3	A	0.35	LOS E	Y	-	-
H	17th Street & Broadway	Overall Intersection	8.4	A	0.18	LOS E	Y	-	-
I	17th Street & C Street	Overall Intersection	15.0	B	0.23	LOS E	Y	-	-
J	17th Street & G Street	Overall Intersection	4.5	A	0.13	LOS E	Y	-	-
46	McLoughlin Blvd. @ Columbia St.	Overall Intersection	19.0	B	0.60	LOS E	Y	-	-
K	McLoughlin Blvd. @ Washington St.	Overall Intersection	6.5	A	0.53	LOS E	Y	-	-
47	McLoughlin Blvd. @ Main St.	Overall Intersection	14.4	B	0.87	LOS E	Y	200 50	200 (NBLTR) 100 (SBR)
48	McLoughlin Blvd. @ Broadway	Overall Intersection	12.9	B	0.61	LOS E	Y	75	125 (EBL)
L	McLoughlin Blvd. @ C St.	Overall Intersection	8.5	A	0.45	LOS E	Y	-	-
M	McLoughlin Blvd. @ G St.	Southbound Left/Thru/Right	6.5	A	-	LOS E	Y	-	-
II	McLoughlin Blvd. @ Clark College Park & Ride	Overall Intersection	8.7	A	0.38	LOS D	Y	-	-
JJ	McLoughlin Blvd. @ Marshall CC East	Overall Intersection	8.1	A	0.32	LOS D	Y	-	-
49	McLoughlin Blvd. @ Fort Vancouver Way	Overall Intersection	15.4	B	0.55	LOS D	Y	-	-
50	24th St. @ Columbia St.	Eastbound Left/Thru/Right	4.0	A	0.02	LOS E	Y	-	-
51	24th St. @ Main St.	Eastbound Left/Right	9.3	A	0.07	LOS E	Y	-	-
52	4th Plain Blvd. @ Columbia St.	Overall Intersection	32.8	C	0.64	LOS D	Y	-	-
53	4th Plain Blvd. @ Main St.	Overall Intersection	49.5	D	0.78	LOS D	Y	250 495 170 195 75 75 75	300 (EBL) 500 (EBTR) 225 (WBL) 200 (WBTR) 100 (NBL) 125 (NBR) 125 (SBL)
54	4th Plain Blvd. @ Broadway	Overall Intersection	33.9	C	0.73	LOS D	Y	195 195	200 (EBLTR) 200 (SBLTR)
55	4th Plain Blvd. @ F St.	Overall Intersection	7.3	A	0.55	LOS D	Y	150	150 (EBT)
56	4th Plain Blvd. @ I-5 SB On-/Off-Ramps	Overall Intersection	16.5	B	0.56	LOS D	Y	200	275 (EBL)
57	4th Plain Blvd. @ I-5 NB On-/Off-Ramps	Overall Intersection	29.7	C	0.72	LOS D	Y	-	-
58	4th Plain Blvd. @ Post Cemetery	Eastbound Left	21.5	C	0.01	LOS E	Y	-	-
59	4th Plain Blvd. @ St. Johns Blvd.	Overall Intersection	40.3	D	0.57	LOS D	Y	175	250 (EBL)
60	28th St. @ Main St.	Eastbound Left/Thru/Right	9.5	A	0.10	LOS E	Y	-	-
61	28th St. @ Broadway	Westbound Left	4.6	A	0.03	LOS E	Y	-	-
62	29th St. @ Main St./Broadway	Westbound Left/Thru/Right	29.7	D	0.00	LOS E	Y	-	-
63	33rd St. @ Main St.	Overall Intersection	> 100	F	0.58	LOS D	N	50 770 50 600 1000 75	100 (EBL) 775 (EBTR) 100 (WBL) 600 (WBTR) 1000 (NBT) 100 (SBL)
64	39th St. @ Main St.	Overall Intersection	> 100	F	1.06	LOS D	Y**	75 1270 75 215 75 1570 125 360	200 (EBL) 1275 (EBTR) 225 (WBL) 225 (WBTR) 125 (NBL) 1575 (NBTR) 175 (SBL) 375 (SBT)
65	39th St. @ F St.	Westbound Thru/Right	50.4	F	0.60	LOS E	Y*	215 430	225 (EBTR) 450 (WBTR)
66	39th St. @ H St.	Overall Intersection	> 100	F	0.80	LOS D	N	430 135 310	450 (EBTR) 150 (WBTR) 325 (SBLTR)
67	39th St. @ I-5 SB On-/Off-Ramps	Overall Intersection	65.7	E	0.89	LOS D	N	135 55 730 680	200 (EBT) 125 (EBR) 775 (WBT) 725 (NBR)
68	39th St. @ I-5 NB On-/Off-Ramps	Overall Intersection	> 100	F	1.10	LOS D	Y**	300 710 1170 790 75	425 (EBL) 725 (EBT) 1175 (WBTR) 800 (NBLT) 150 (NBR)
69	WSDOT/40th St. @ Main St.	Overall Intersection	65.1	E	0.39	LOS D	N	150 1200	200 (SBL) 1200 (SBTR)
70	45th St. @ Main St.	Overall Intersection	38.5	D	0.51	LOS D	Y	200 560	225 (EBL) 575 (SBTR)
71	Hazel Dell @ Main St. (West)	Overall Intersection	27.7	C	0.63	LOS D	Y	-	-
72	Ross St. @ Main St.	Overall Intersection	15.2	B	0.68	LOS D	Y	60 60	100 (WBL) 75 (WBR)
73	Ross St. @ North Rd.	Southbound Thru/Right	42.0	E	0.29	LOS E	Y	-	-

PM Peak Hour — 2030 LPA (Broadway-Washington/17th)

#	Intersection	Approach/Movement	Delay (Seconds)	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2]	Meets Standard	Storage Length	95% Queue (ft)
45	15th St. @ C St.	Overall Intersection	119.0	> 100	F	1.35	LOS E	N	-	-
D	16th St. @ Washington St.	Overall Intersection	23.5	23.5	C	0.29	LOS E	Y	65	75 (WBLT)
HH	16th St. @ Mill District Park & Ride	Northbound Right	3.9	3.9	A	0.15	LOS E	Y	-	-
E	16th St. @ Main St.	Overall Intersection	11.2	11.2	B	0.61	LOS E	Y	85	100 (EBLTR)
F	17th Street & Washington	Overall Intersection	10.4	10.4	B	0.26	LOS E	Y	-	-
G	17th Street & Main	Overall Intersection	8.3	8.3	A	0.35	LOS E	Y	-	-
H	17th Street & Broadway	Overall Intersection	8.4	8.4	A	0.18	LOS E	Y	-	-
I	17th Street & C Street	Overall Intersection	15.0	15.0	B	0.23	LOS E	Y	-	-
J	17th Street & G Street	Overall Intersection	4.5	4.5	A	0.13	LOS E	Y	-	-
46	McLoughlin Blvd. @ Columbia St.	Overall Intersection	19.0	19.0	B	0.60	LOS E	Y	-	-
K	McLoughlin Blvd. @ Washington St.	Overall Intersection	6.5	6.5	A	0.53	LOS E	Y	-	-
47	McLoughlin Blvd. @ Main St.	Overall Intersection	14.4	14.4	B	0.87	LOS E	Y	200 50	200 (NBLTR) 100 (SBR)
48	McLoughlin Blvd. @ Broadway	Overall Intersection	12.9	12.9	B	0.61	LOS E	Y	75	125 (EBL)
L	McLoughlin Blvd. @ C St.	Overall Intersection	8.5	8.5	A	0.45	LOS E	Y	-	-
M	McLoughlin Blvd. @ G St.	Southbound Left/Thru/Right	6.5	6.5	A	-	LOS E	Y	-	-
II	McLoughlin Blvd. @ Clark College Park & Ride	Overall Intersection	8.7	8.7	A	0.38	LOS D	Y	-	-
JJ	McLoughlin Blvd. @ Marshall CC East	Overall Intersection	8.1	8.1	A	0.32	LOS D	Y	-	-
49	McLoughlin Blvd. @ Fort Vancouver Way	Overall Intersection	15.4	15.4	B	0.55	LOS D	Y	-	-
50	24th St. @ Columbia St.	Eastbound Left/Thru/Right	4.0	4.0	A	0.02	LOS E	Y	-	-
51	24th St. @ Main St.	Eastbound Left/Right	9.3	9.3	A	0.07	LOS E	Y	-	-
52	4th Plain Blvd. @ Columbia St.	Overall Intersection	32.8	32.8	C	0.64	LOS D	Y	-	-
53	4th Plain Blvd. @ Main St.	Overall Intersection	49.5	49.5	D	0.78	LOS D	Y	250 495 170 195 75 75 75	300 (EBL) 500 (EBTR) 225 (WBL) 200 (WBTR) 100 (NBL) 125 (NBR) 125 (SBL)
54	4th Plain Blvd. @ Broadway	Overall Intersection	33.9	33.9	C	0.73	LOS D	Y	195 195	200 (EBLTR) 200 (SBLTR)
55	4th Plain Blvd. @ F St.	Overall Intersection	7.3	7.3	A	0.55	LOS D	Y	150	150 (EBT)
56	4th Plain Blvd. @ I-5 SB On-/Off-Ramps	Overall Intersection	16.5	16.5	B	0.56	LOS D	Y	200	275 (EBL)
57	4th Plain Blvd. @ I-5 NB On-/Off-Ramps	Overall Intersection	29.7	29.7	C	0.72	LOS D	Y	-	-
58	4th Plain Blvd. @ Post Cemetery	Eastbound Left	21.5	21.5	C	0.01	LOS E	Y	-	-
59	4th Plain Blvd. @ St. Johns Blvd.	Overall Intersection	40.3	40.3	D	0.57	LOS D	Y	175	250 (EBL)
60	28th St. @ Main St.	Eastbound Left/Thru/Right	9.5	9.5	A	0.10	LOS E	Y	-	-
61	28th St. @ Broadway	Westbound Left	4.6	4.6	A	0.03	LOS E	Y	-	-
62	29th St. @ Main St./Broadway	Westbound Left/Thru/Right	29.7	29.7	D	0.00	LOS E	Y	-	-
63	33rd St. @ Main St.	Overall Intersection	14.5	14.5	B	0.58	LOS D	Y	50 50	75 (EBL) 75 (WBL)
64	39th St. @ Main St.	Overall Intersection	283.4	> 100	F	1.03	LOS D	Y**	75 1270 175 215 75 125	200 (EBL) 1275 (EBTR) 200 (WBL) 225 (WBTR) 125 (NBL) 200 (SBL)
65	39th St. @ F St.	Westbound Thru/Right	50.6	50.6	F	0.59	LOS E	Y*	430	450 (WBTR)
66	39th St. @ H St.	Overall Intersection	30.8	30.8	C	0.76	LOS D	Y	435 135	450 (EBTR) 150 (WBTR)
67	39th St. @ I-5 SB On-/Off-Ramps	Westbound Thru	71.0	71.0	F	0.63	LOS E	N	55 730	100 (EBR) 750 (WBT)
68	39th St. @ I-5 NB On-/Off-Ramps	Overall Intersection	401.4	> 100	F	0.65	LOS D	Y**	1175 790 75	1175 (WBT) 800 (NBL) 150 (NBR)
69	WSDOT/40th St. @ Main St.	Overall Intersection	4.2	4.2	A	0.41	LOS D	Y	-	-
70	45th St. @ Main St.	Overall Intersection	11.6	11.6	B	0.51	LOS D	Y	-	-
71	Hazel Dell @ Main St. (West)	Overall Intersection	18.8	18.8	B	0.63	LOS D	Y	-	-
72	Ross St. @ Main St.	Overall Intersection	15.2	15.2	B	0.68	LOS D	Y	60 60	100 (WBL) 75 (WBR)
73	Ross St. @ North Rd.	Southbound Thru/Right	47.8	47.8	E	0.29	LOS E	Y	-	-

Delay / LOS affected by freeway congestion
Intersection queuing spills back into upstream intersection
Note 1 The ICU is used for overall intersections (signalized and unsignalized). The V/C is used for the identified movement(s) at unsignalized intersections.
Note 2 The 2003 Vancouver Concurrency Administration Manual designates an acceptable LOS standard of LOS E for downtown and LOS D for all other intersections.
Note 3 2030 LPA and LPA Phase I Roundabout intersection operations taken from VISSIM analysis
* Intersection not modeled in existing conditions scenario
Y* Intersection does not meet standard in the Build scenario, but meets the "do no worse" criteria as compared to the No Build.
Y** Intersection operations are no worse than No Build, and no mitigation is required.

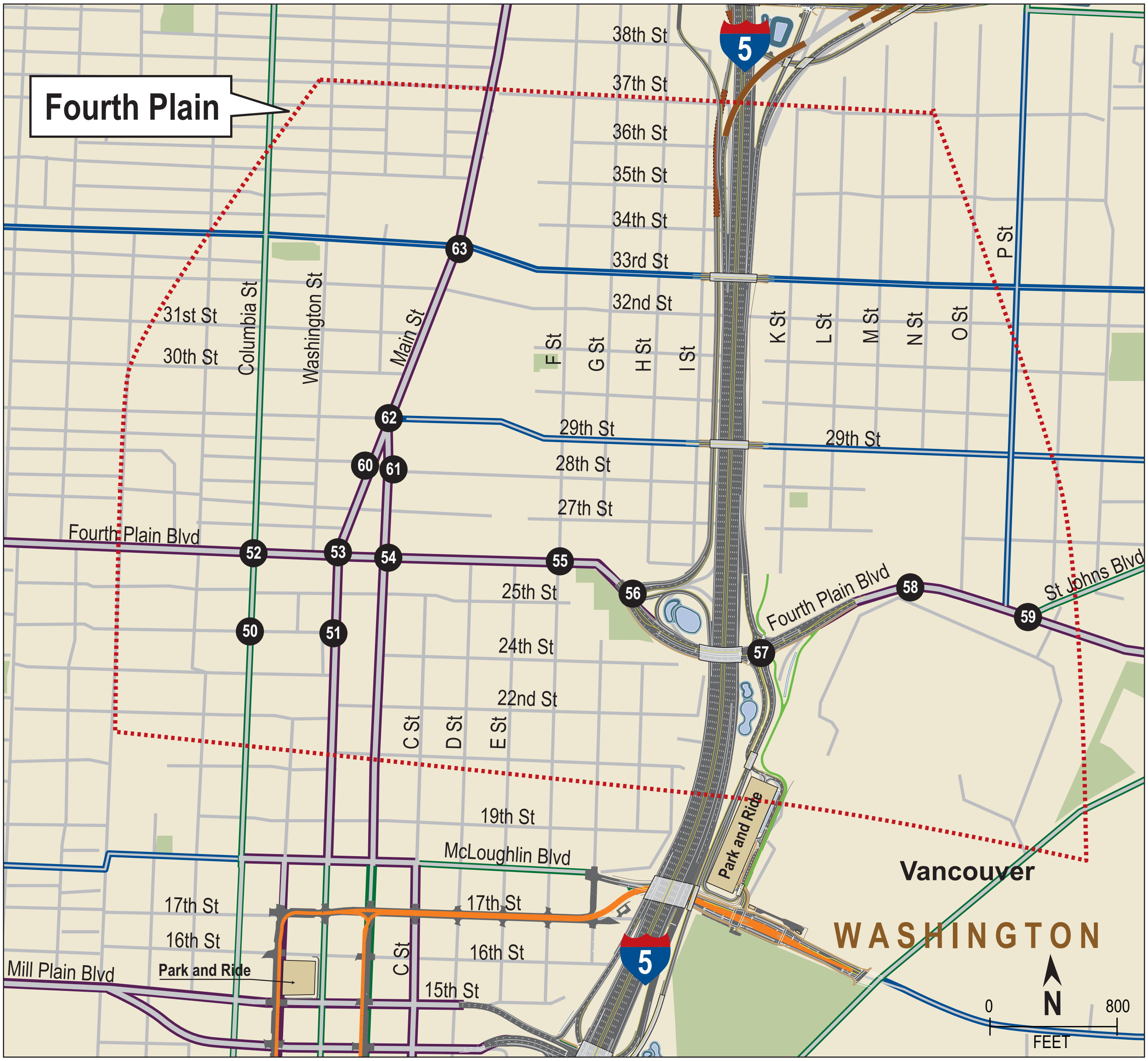
Exhibit 7-33

- Principal Arterial
- Minor Arterial
- Collector
- Intersection Analyzed
- Sub-areas
- New Bridge
- Existing Bridge
- Roadway Improvements
- Tunnel
- New Transit Alignment
- New Bicycle/Pedestrian Route
- Existing MAX Yellow Line/Station
- Parks
- Ponds
- Sidewalks

LPA
Mill Plain Interchange Sub-area

Columbia River CROSSING

Exhibit 7-34



- Principal Arterial
- Minor Arterial
- Collector
- Intersection Analyzed
- Sub-areas
- New Bridge
- Existing Bridge
- Roadway Improvements
- Tunnel
- New Transit Alignment
- New Bicycle/Pedestrian Route
- Existing MAX Yellow Line/Station
- Parks
- Ponds
- Sidewalks

LPA
Fourth Plain Interchange Sub-area

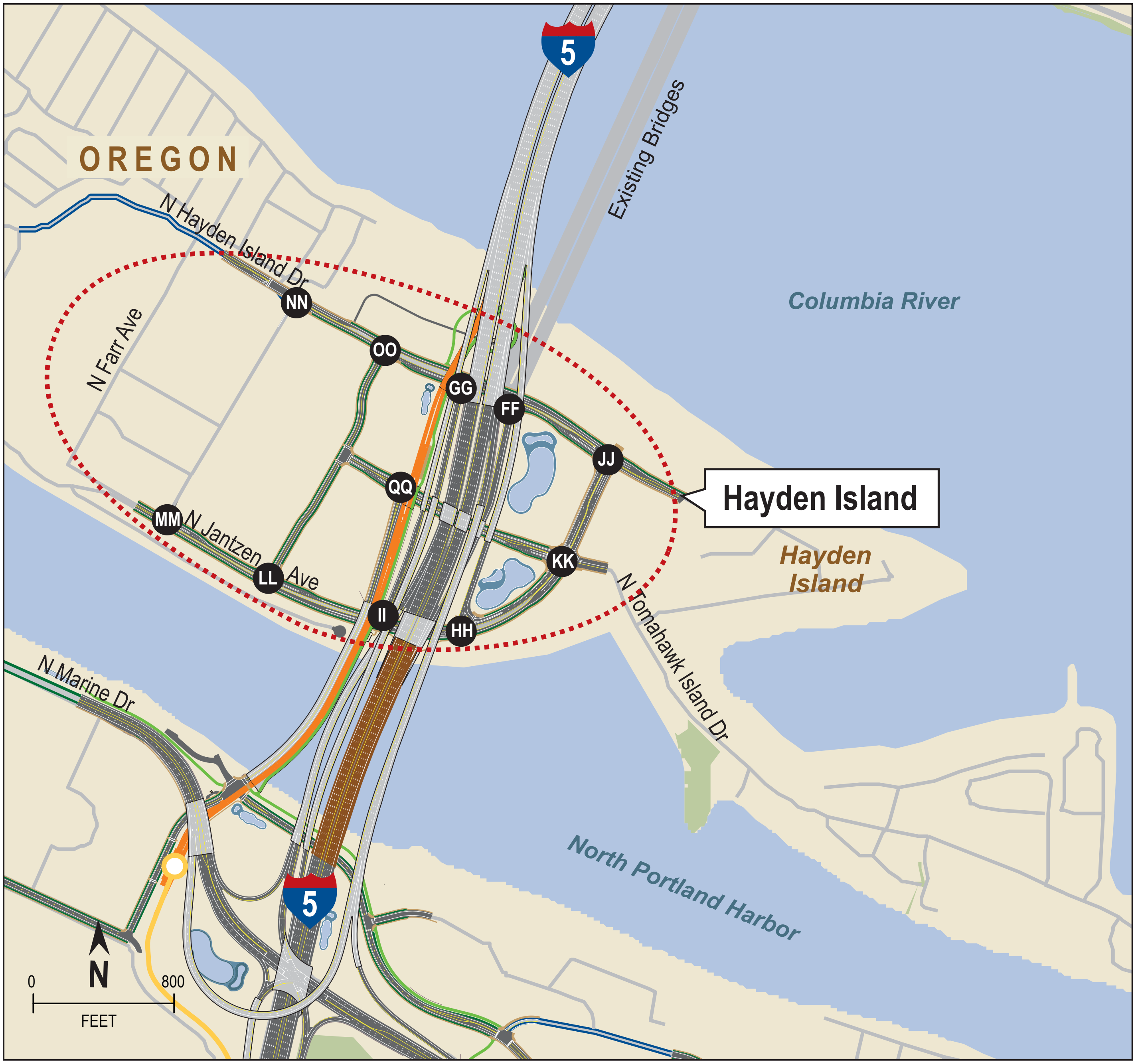
Columbia River CROSSING

Exhibit 7-35

LPA
SR 500/Main Street
Interchange Sub-area

Columbia River CROSSING

Exhibit 7-36



Principal Arterial
Minor Arterial
Collector
Intersection Analyzed
Sub-areas
New Bridge
Existing Bridge
Roadway Improvements
Tunnel
New Transit Alignment
New Bicycle/Pedestrian Route
Existing MAX Yellow Line/Station
Parks
Ponds
Sidewalks

LPA
Hayden Island Interchange Sub-area

Columbia River CROSSING

Exhibit 7-37

Portland Intersection Performance Results

AM Peak Hour — 2030 No-Build

#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2,3,4]	Meets Standard	Storage Length	95% Queue (ft)
01	Fremont and MLK Jr.	***Overall Intersection***	87.6	F	0.93	LOS D	N	125	250 (WBL)
02	Going and Interstate	***Overall Intersection***	52.9	D	0.88	LOS D	Y	125	275 (WBL)
								125	150 (NBL)
								355	450 (EBL)
03	Alberta and Interstate	***Overall Intersection***	27.5	C	0.73	LOS D	Y	100	150 (SBL)
04	Alberta and SB I-5 Off-Ramp	***Overall Intersection***	46.3	D	0.78	0.85	Y	75	125 (WBL)
								175	175 (WBT)
05	Alberta and NB I-5 Off-Ramp	***Overall Intersection***	53.9	D	0.43	0.85	Y	75	100 (EBL)
06	Alberta and MLK Jr.	***Overall Intersection***	39.8	D	0.89	LOS D	Y	75	125 (WBR)
								100	150 (NBL)
								100	125 (SBL)
07	Rosa Parks and Interstate	***Overall Intersection***	20.6	C	0.62	LOS D	Y	100	125 (WBL)
08	Rosa Parks and I-5 SB On-/Off Ramps	***Overall Intersection***	18.8	B	0.53	0.85	Y	125	150 (SWR)
09	Rosa Parks and I-5 NB On-/Off Ramps	***Overall Intersection***	12.6	B	0.44	0.85	Y	-	-
10	Rosa Parks and MLK Jr.	***Overall Intersection***	14.7	B	0.70	LOS D	Y	100	150 (NBL)
11	Lombard and Interstate	***Overall Intersection***	> 100	F	0.90	0.99	Y	150	325 (WBL)
								225	275 (NBL)
								150	275 (EBL)
								1155	1175 (EBTR)
								555	1100 (WBTR)
12	Lombard and I-5 SB On-Ramps	Westbound Thru	12.9	B	0.42	0.85	Y	-	-
13	Lombard and I-5 NB Off-Ramps	Northbound Right	16.8	C	0.57	0.85	Y	-	-
14	Lombard and MLK Jr.	***Overall Intersection***	> 100	F	0.88	0.99	Y	100	175 (EBL)
								100	175 (WBL)
								100	200 (NBL)
								150	300 (SBL)
15	Interstate and Argyle	***Overall Intersection***	26.7	C	0.69	LOS D	Y	75	125 (EBR)
								50	125 (NBL)
								150	150 (NBT)
16	Columbia Blvd and I-5 Ramps	***Overall Intersection***	14.9	B	0.63	0.85	Y	150	200 (WBR)
17	Columbia Blvd and MLK Jr.	***Overall Intersection***	37.2	D	0.89	0.99	Y	100	200 (NBL)
								225	250 (SBL)
18	Victory and Expo Road	***Overall Intersection***	2.9	A	0.22	LOS E	Y	-	-
19	Victory Blvd and I-5 SB On-Ramp	Westbound Left/Thru	1.3	A	0.21	0.85	Y	-	-
20	Victory Blvd and NB On-/Off-Ramps	***Overall Intersection***	5.0	A	0.13	0.85	Y	-	-
21	Union Ct and I-5 NB Off-Ramp	Eastbound Left	8.4	A	0.28	0.85	Y	-	-
22	Union Ct/Marine Way and Vancouver Way	***Overall Intersection***	6.4	A	0.46	LOS E	Y	-	-
23	Marine Dr and I-5 On-/Off-Ramps	***Overall Intersection***	> 100	F	0.83	0.85	Y	200	2075 (NBL)
								275	350 (EBL)
24	Center Ave and I-5 SB On-/Off Ramps	***Overall Intersection***	11.2	B	0.35	0.85	Y	-	-
25	Hayden Island Dr and Hayden Island Dr South	***Overall Intersection***	9.5	A	0.32	0.85	Y	-	-
AA	Vancouver Way and MLK Jr. ramps								
BB	Vancouver Way and new underpass								
CC	Union Ct and new underpass								
DD	Union Ct and MLK ramps								
EE	Connector Road and Marine Drive								
FF	Hayden Island Northbound Off-Ramp								
GG	Hayden Island Southbound On-Ramp								
HH	Hayden Island Northbound On-Ramp								
II	Hayden Island Southbound Off-Ramp								
JJ	Hayden Island Drive and Jantzen Drive								
KK	Tomahawk Island Drive and Jantzen Drive								
LL	Jantzen Ave and Sunrise								
MM	Jantzen Ave and Main Street								
NN	Hayden Island Drive and Main Street								
OO	Hayden Island Drive and Sunrise								
PP	Local Bridge and Little Marine Drive								
QQ	Local Bridge and Tomahawk Is Drive								

2030 LPA Option A with Highway Phasing

#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[3,4,5,6]	Meets Standard	Storage Length	95% Queue (ft)
01	Fremont and MLK Jr.	***Overall Intersection***	58.7	E	0.92	LOS D	Y*	125	250 (WBL)
02	Going and Interstate	***Overall Intersection***	78.4	E	0.88	LOS D	N	355	550 (EBL)
								125	300 (WBL)
								175	300 (NBL)
03	Alberta and Interstate	***Overall Intersection***	25.3	C	0.79	LOS D	Y	100	150 (SBL)
04	Alberta and SB I-5 Off-Ramp	***Overall Intersection***	22.0	C	0.68	0.85	Y	75	125 (WBL)
								175	175 (WBT)
05	Alberta and NB I-5 Off-Ramp	***Overall Intersection***	34.5	C	0.41	0.85	Y	75	125 (EBL)
06	Alberta and MLK Jr.	***Overall Intersection***	34.6	C	0.87	LOS D	Y	75	150 (WBR)
								100	150 (NBL)
								100	175 (SBL)
07	Rosa Parks and Interstate	***Overall Intersection***	20.1	C	0.65	LOS D	Y	-	-
08	Rosa Parks and I-5 SB On-/Off Ramps	***Overall Intersection***	17.8	B	0.49	0.85	Y	-	-
09	Rosa Parks and I-5 NB On-/Off Ramps	***Overall Intersection***	13.2	B	0.44	0.85	Y	-	-
10	Rosa Parks and MLK Jr.	***Overall Intersection***	15.1	B	0.71	LOS D	Y	100	125 (NBL)
11	Lombard and Interstate	***Overall Intersection***	> 100	F	0.77	0.99	Y	150	325 (WBL)
								555	625 (WBTR)
								225	400 (NBL)
12	Lombard and I-5 SB On-Ramps	Westbound Thru	4.3	A	0.70	0.85	Y	-	-
13	Lombard and I-5 NB Off-Ramps	Northbound Right	7.1	A	0.59	0.85	Y	-	-
14	Lombard and MLK Jr.	***Overall Intersection***	> 100	F	0.85	0.99	Y	100	200 (EBL)
								100	200 (WBL)
								100	200 (NBL)
								150	300 (SBL)
15	Interstate and Argyle	***Overall Intersection***	23.0	C	0.69	LOS D	Y	75	125 (EBR)
								50	125 (NBL)
								150	150 (NBT)
16	Columbia Blvd and I-5 Ramps	***Overall Intersection***	13.8	B	0.54	0.85	Y	-	-
17	Columbia Blvd and MLK Jr.	***Overall Intersection***	33.1	C	0.72	0.99	Y	100	225 (NBL)
								225	300 (SBL)
18	Victory and Expo Road	***Overall Intersection***	2.6	A	0.20	LOS E	Y	-	-
19	Victory Blvd and I-5 SB On-Ramp	Westbound Left/Thru	1.1	A	0.10	0.85	Y	-	-
20	Victory Blvd and NB On-/Off-Ramps	***Overall Intersection***	5.6	A	0.28	0.85	Y	-	-
21	Union Ct and I-5 NB Off-Ramp								
22	Union Ct/Marine Way and Vancouver Way								
23	Marine Dr and I-5 On-/Off-Ramps	***Overall Intersection***	15.8	B	0.47	0.75	Y	-	-
24	Center Ave and I-5 SB On-/Off Ramps								
25	Hayden Island Dr and Hayden Island Dr South								
AA	Vancouver Way and MLK Jr. ramps	***Overall Intersection***	10.7	B	0.61	0.75	Y	-	-
BB	Vancouver Way and new underpass	***Overall Intersection***	14.9	B	0.62	LOS D	Y	-	-
CC	Union Ct and new underpass	Eastbound Left/Right	5.4	A	0.03	LOS E	Y	-	-
DD	Union Ct and MLK ramps	Westbound Right	3.7	A	0.41	0.75	Y	-	-
EE	Connector Road and Marine Drive	Southbound Left/Right	8.9	A	0.07	LOS E	Y	-	-
FF	Hayden Island Northbound Off-Ramp	***Overall Intersection***	13.4	B	0.32	0.75	Y	-	-
GG	Hayden Island Southbound On-Ramp	***Overall Intersection***	6.4	A	0.27	0.75	Y	-	-
HH	Hayden Island Northbound On-Ramp	***Overall Intersection***	7.2	A	0.28	0.75	Y	-	-
II	Hayden Island Southbound Off-Ramp	***Overall Intersection***	2.6	A	0.35	0.75	Y	-	-
JJ	Hayden Island Drive and Jantzen Drive	***Overall Intersection***	11.2	B	0.35	0.85	Y	-	-
KK	Tomahawk Island Drive and Jantzen Drive	***Overall Intersection***	16.5	B	0.57	0.85	Y	-	-
LL	Jantzen Ave and Sunrise	Southbound Left/Right	6.4	A	0.02	0.85	Y	-	-
MM	Jantzen Ave and Main Street	***Overall Intersection***	12.0	B	0.43	0.85	Y	-	-
NN	Hayden Island Drive and Main Street	***Overall Intersection***	7.8	A	0.38	0.85	Y	-	-
OO	Hayden Island Drive and Sunrise	Northbound Right	3.8	A	0.08	0.85	Y	-	-
PP	Local Bridge and Little Marine Drive	***Overall Intersection***	4.4	A	0.32	LOS D	Y	-	-
QQ	Local Bridge and Tomahawk Is Drive	***Overall Intersection***	3.4	A	0.21	LOS D	Y	-	-

2030 LPA Option A

#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[3,4,5,6]	Meets Standard	Storage Length	95% Queue (ft)
01	Fremont and MLK Jr.	***Overall Intersection***	58.7	E	0.92	LOS D	Y*	125	250 (WBL)
02	Going and Interstate	***Overall Intersection***	78.4	E	0.88	LOS D	N	355	550 (EBL)
								125	300 (WBL)
								175	300 (NBL)
03	Alberta and Interstate	***Overall Intersection***	25.3	C	0.79	LOS D	Y	100	150 (SBL)
04	Alberta and SB I-5 Off-Ramp	***Overall Intersection***	22.0	C	0.68	0.85	Y	75	125 (WBL)
								175	175 (WBT)
05	Alberta and NB I-5 Off-Ramp	***Overall Intersection***	34.5	C	0.41	0.85	Y	75	125 (EBL)
06	Alberta and MLK Jr.	***Overall Intersection***	34.6	C	0.87	LOS D	Y	75	150 (WBR)
								100	150 (NBL)
								100	175 (SBL)
07	Rosa Parks and Interstate	***Overall Intersection***	20.1	C	0.65	LOS D	Y	-	-
08	Rosa Parks and I-5 SB On-/Off Ramps	***Overall Intersection***	17.8	B	0.49	0.85	Y	-	-
09	Rosa Parks and I-5 NB On-/Off Ramps	***Overall Intersection***	13.2	B	0.44	0.85	Y	-	-
10	Rosa Parks and MLK Jr.	***Overall Intersection***	15.1	B	0.71	LOS D	Y	100	125 (NBL)
11	Lombard and Interstate	***Overall Intersection***	> 100	F	0.77	0.99	Y	150	325 (WBL)
								555	625 (WBTR)
								225	400 (NBL)
12	Lombard and I-5 SB On-Ramps	Westbound Thru	4.3	A	0.70	0.85	Y	-	-
13	Lombard and I-5 NB Off-Ramps	Northbound Right	7.1	A	0.59	0.85	Y	-	-
14	Lombard and MLK Jr.	***Overall Intersection***	> 100	F	0.85	0.99	Y	100	200 (EBL)
								100	200 (WBL)
								100	200 (NBL)
								150	300 (SBL)
15	Interstate and Argyle	***Overall Intersection***	23.0	C	0.69	LOS D	Y	75	125 (EBR)
								50	125 (NBL)
								150	150 (NBT)
16	Columbia Blvd and I-5 Ramps	***Overall Intersection***	13.8	B	0.54	0.85	Y	-	-
17	Columbia Blvd and MLK Jr.	***Overall Intersection***	33.1	C	0.72	0.99	Y	100	225 (NBL)
								225	300 (SBL)
18	Victory and Expo Road	***Overall Intersection***	2.6	A	0.20	LOS E	Y	-	-
19	Victory Blvd and I-5 SB On-Ramp	Westbound Left/Thru	1.1	A	0.10	0.85	Y	-	-
20	Victory Blvd and NB On-/Off-Ramps	***Overall Intersection***	5.6	A	0.28	0.85	Y	-	-
21	Union Ct and I-5 NB Off-Ramp								
22	Union Ct/Marine Way and Vancouver Way								
23	Marine Dr and I-5 On-/Off-Ramps	***Overall Intersection***	10.2	B	0.37	0.75	Y	-	-
24	Center Ave and I-5 SB On-/Off Ramps								
25	Hayden Island Dr and Hayden Island Dr South								
AA	Vancouver Way and MLK Jr. ramps	***Overall Intersection***	12.1	B	0.61	0.75	Y	-	-
BB	Vancouver Way and new underpass	***Overall Intersection***	14.6	B	0.62	LOS D	Y	-	-
CC	Union Ct and new underpass	Eastbound Left/Right	4.9	A	0.03	LOS E	Y	-	-
DD	Union Ct and MLK ramps	Westbound Right	3.4	A	0.41	0.75	Y	-	-
EE	Connector Road and Marine Drive	Southbound Left/Right	9.7	A	0.07	LOS E	Y	-	-
FF	Hayden Island Northbound Off-Ramp	***Overall Intersection***	12.5	B	0.32	0.75	Y	-	-
GG	Hayden Island Southbound On-Ramp	***Overall Intersection***	5.9	A	0.27	0.75	Y	-	-
HH	Hayden Island Northbound On-Ramp	***Overall Intersection***	14.4	B	0.26	0.75	Y	-	-
II	Hayden Island Southbound Off-Ramp	***Overall Intersection***	4.3	A	0.35	0.75	Y	-	-
JJ	Hayden Island Drive and Jantzen Drive	***Overall Intersection***	10.8	B	0.34	0.85	Y	-	-
KK	Tomahawk Island Drive and Jantzen Drive	***Overall Intersection***	16.3	B	0.57	0.85	Y	-	-
LL	Jantzen Ave and Sunrise	Southbound Left/Right	7.3	A	0.02	0.85	Y	-	-
MM	Jantzen Ave and Main Street	***Overall Intersection***	6.7	A	0.40	0.85	Y	-	-
NN	Hayden Island Drive and Main Street	***Overall Intersection***	7.5	A	0.38	0.85	Y	-	-
OO	Hayden Island Drive and Sunrise	Northbound Right	4.0	A	0.08	0.85	Y	-	-
PP	Local Bridge and Little Marine Drive	***Overall Intersection***	4.4	A	0.32	LOS D	Y	-	-
QQ	Local Bridge and Tomahawk Is Drive	***Overall Intersection***	2.0	A	0.21	LOS D	Y	-	-

2030 LPA Option B with Highway Phasing

#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[3,4,5,6]	Meets Standard	Storage Length	95% Queue (ft)
01	Fremont and MLK Jr.	***Overall Intersection***	58.7	E	0.92	LOS D	Y*	125	250 (WBL)
02	Going and Interstate	***Overall Intersection***	78.4	E	0.88	LOS D	N	355	550 (EBL)
								125	300 (WBL)
								175	300 (NBL)
03	Alberta and Interstate	***Overall Intersection***	25.3	C	0.79	LOS D	Y	100	150 (SBL)
04	Alberta and SB I-5 Off-Ramp	***Overall Intersection***	22.0	C	0.68	0.85	Y	75	125 (WBL)
								175	175 (WBT)
05	Alberta and NB I-5 Off-Ramp	***Overall Intersection***	34.5	C	0.41	0.85	Y	75	125 (EBL)
06	Alberta and MLK Jr.	***Overall Intersection***	34.6	C	0.87	LOS D	Y	75	150 (WBR)
								100	150 (NBL)
								100	175 (SBL)
07	Rosa Parks and Interstate	***Overall Intersection***	20.1	C	0.65	LOS D	Y	-	-
08	Rosa Parks and I-5 SB On-/Off Ramps	***Overall Intersection***	17.8	B	0.49	0.85	Y	-	-
09	Rosa Parks and I-5 NB On-/Off Ramps	***Overall Intersection***	13.2	B	0.44	0.85	Y	-	-
10	Rosa Parks and MLK Jr.	***Overall Intersection***	15.1	B	0.71	LOS D	Y	100	125 (NBL)
11	Lombard and Interstate	***Overall Intersection***	> 100	F	0.77	0.99	Y	150	325 (WBL)
								555	625 (WBTR)
								225	400 (NBL)
12	Lombard and I-5 SB On-Ramps	Westbound Thru	4.3	A	0.70	0.85	Y	-	-
13	Lombard and I-5 NB Off-Ramps	Northbound Right	7.1	A	0.59	0.85	Y	-	-
14	Lombard and MLK Jr.	***Overall Intersection***	> 100	F	0.85	0.99	Y	100	200 (EBL)
								100	200 (WBL)
								100	200 (NBL)
								150	300 (SBL)
15	Interstate and Argyle	***Overall Intersection***	23.0	C	0.69	LOS D	Y	75	125 (EBR)
								50	125 (NBL)
								150	150 (NBT)
16	Columbia Blvd and I-5 Ramps	***Overall Intersection***	13.8	B	0.54	0.85	Y	-	-
17	Columbia Blvd and MLK Jr.	***Overall Intersection***	33.1	C	0.72	0.99	Y	100	225 (NBL)
								225	300 (SBL)
18	Victory and Expo Road	***Overall Intersection***	2.6	A	0.20	LOS E	Y	-	-
19	Victory Blvd and I-5 SB On-Ramp	Westbound Left/Thru	1.1	A	0.10	0.85	Y	-	-
20	Victory Blvd and NB On-/Off-Ramps	***Overall Intersection***	5.6	A	0.28	0.85	Y	-	-
21	Union Ct and I-5 NB Off-Ramp								
22	Union Ct/Marine Way and Vancouver Way								
23	Marine Dr and I-5 On-/Off-Ramps	***Overall Intersection***	15.2	B	0.50	0.75	Y	-	-
24	Center Ave and I-5 SB On-/Off Ramps								
25	Hayden Island Dr and Hayden Island Dr South								
AA	Vancouver Way and MLK Jr. ramps	***Overall Intersection***	14.1	B	0.62	0.75	Y	-	-
BB	Vancouver Way and new underpass	***Overall Intersection***	16.7	B	0.60	LOS D	Y	-	-
CC	Union Ct and new underpass	Northbound Thru	4.2	A	0.31	LOS E	Y	-	-
DD	Union Ct and MLK ramps	Westbound Right	4.0	A	0.44	0.75	Y	-	-
EE	Connector Road and Marine Drive	***Overall Intersection***	11.0	B	0.56	LOS D	Y	-	-
FF	Hayden Island Northbound Off-Ramp	***Overall Intersection***	15.7	B	0.45	0.75	Y	-	-
GG	Hayden Island Southbound On-Ramp	***Overall Intersection***	3.9	A	0.35	0.75	Y	-	-
HH	Hayden Island Northbound On-Ramp	***Overall Intersection***	13.7	B	0.37	0.75	Y	-	-
II	Hayden Island Southbound Off-Ramp	***Overall Intersection***	4.2	A	0.37	0.75	Y	-	-
JJ	Hayden Island Drive and Jantzen Drive	***Overall Intersection***	10.7	B	0.35	0.85	Y	-	-
KK	Tomahawk Island Drive and Jantzen Drive	***Overall Intersection***	15.8	B	0.57	0.85	Y	-	-
LL	Jantzen Ave and Sunrise	Southbound Left/Right	3.5	A	0.01	0.85	Y	-	-
MM	Jantzen Ave and Main Street	***Overall Intersection***	6.6	A	0.41	0.85	Y	-	-
NN	Hayden Island Drive and Main Street	***Overall Intersection***	8.3	A	0.41	0.85	Y	-	-
OO	Hayden Island Drive and Sunrise	Northbound Right	4.8	A	0.12	0.85	Y	-	-
PP	Local Bridge and Little Marine Drive								
QQ	Local Bridge and Tomahawk Is Drive								

2030 LPA Option B

#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[3,4,5,6]	Meets Standard	Storage Length	95% Queue (ft)
01	Fremont and MLK Jr.	***Overall Intersection***	58.7	E	0.92	LOS D	Y*	125	250 (WBL)
02	Going and Interstate	***Overall Intersection***	78.4	E	0.88	LOS D	N	355	550 (EBL)
								125	300 (WBL)
								175	300 (NBL)
03	Alberta and Interstate	***Overall Intersection***	25.3	C	0.79	LOS D	Y	100	150 (SBL)
04	Alberta and SB I-5 Off-Ramp	***Overall Intersection***	22.0	C	0.68	0.85	Y	75	125 (WBL)
								175	175 (WBT)
05	Alberta and NB I-5 Off-Ramp	***Overall Intersection***	34.5	C	0.41	0.85	Y	75	125 (EBL)
06	Alberta and MLK Jr.	***Overall Intersection***	34.6	C	0.87	LOS D	Y	75	150 (WBR)
								100	150 (NBL)
								100	175 (SBL)
07	Rosa Parks and Interstate	***Overall Intersection***	20.1	C	0.65	LOS D	Y	-	-
08	Rosa Parks and I-5 SB On-/Off Ramps	***Overall Intersection***	17.8	B	0.49	0.85	Y	-	-
09	Rosa Parks and I-5 NB On-/Off Ramps	***Overall Intersection***	13.2	B	0.44	0.85	Y	-	-
10	Rosa Parks and MLK Jr.	***Overall Intersection***	15.1	B	0.71	LOS D	Y	100	125 (NBL)
11	Lombard and Interstate	***Overall Intersection***	> 100	F	0.77	0.99	Y	150	325 (WBL)
								555	625 (WBTR)
								225	400 (NBL)
12	Lombard and I-5 SB On-Ramps	Westbound Thru	4.3	A	0.70	0.85	Y	-	-
13	Lombard and I-5 NB Off-Ramps	Northbound Right	7.1	A	0.59	0.85	Y	-	-
14	Lombard and MLK Jr.	***Overall Intersection***	> 100	F	0.85	0.99	Y	100	200 (EBL)
								100	200 (WBL)
								100	200 (NBL)
								150	300 (SBL)
15	Interstate and Argyle	***Overall Intersection***	23.0	C	0.69	LOS D	Y	75	125 (EBR)
								50	125 (NBL)
								150	150 (NBT)
16	Columbia Blvd and I-5 Ramps	***Overall Intersection***	13.8	B	0.54	0.85	Y	-	-
17	Columbia Blvd and MLK Jr.	***Overall Intersection***	33.1	C	0.72	0.99	Y	100	225 (NBL)
								225	300 (SBL)
18	Victory and Expo Road	***Overall Intersection***	2.6	A	0.20	LOS E	Y	-	-
19	Victory Blvd and I-5 SB On-Ramp	Westbound Left/Thru	1.1	A	0.10	0.85	Y	-	-
20	Victory Blvd and NB On-/Off-Ramps	***Overall Intersection***	5.6	A	0.28	0.85	Y	-	-
21	Union Ct and I-5 NB Off-Ramp								
22	Union Ct/Marine Way and Vancouver Way								
23	Marine Dr and I-5 On-/Off-Ramps	***Overall Intersection***	11.1	B	0.39	0.75	Y	-	-
24	Center Ave and I-5 SB On-/Off Ramps								
25	Hayden Island Dr and Hayden Island Dr South								
AA	Vancouver Way and MLK Jr. ramps	***Overall Intersection***	12.9	B	0.62	0.75	Y	-	-
BB	Vancouver Way and new underpass	***Overall Intersection***	16.6	B	0.60	LOS D	Y	-	-
CC	Union Ct and new underpass	Northbound Thru	4.3	A	0.31	LOS E	Y	-	-
DD	Union Ct and MLK ramps	Westbound Right	4.2	A	0.44	0.75	Y	-	-
EE	Connector Road and Marine Drive	***Overall Intersection***	12.1	B	0.56	LOS D	Y	-	-
FF	Hayden Island Northbound Off-Ramp	***Overall Intersection***	15.7	B	0.45	0.75	Y	-	-
GG	Hayden Island Southbound On-Ramp	***Overall Intersection***	3.9	A	0.35	0.75	Y	-	-
HH	Hayden Island Northbound On-Ramp	***Overall Intersection***	13.7	B	0.37	0.75	Y	-	-
II	Hayden Island Southbound Off-Ramp	***Overall Intersection***	4.2	A	0.37	0.75	Y	-	-
JJ	Hayden Island Drive and Jantzen Drive	***Overall Intersection***	10.7	B	0.35	0.85	Y	-	-
KK	Tomahawk Island Drive and Jantzen Drive	***Overall Intersection***	15.8	B	0.57	0.85	Y	-	-
LL	Jantzen Ave and Sunrise	Southbound Left/Right	3.5	A	0.01	0.85	Y	-	-
MM	Jantzen Ave and Main Street	***Overall Intersection***	6.6	A	0.41	0.85	Y	-	-
NN	Hayden Island Drive and Main Street	***Overall Intersection***	8.3	A	0.41	0.85	Y	-	-
OO	Hayden Island Drive and Sunrise	Northbound Right	4.8	A	0.12	0.85	Y	-	-
PP	Local Bridge and Little Marine Drive								
QQ	Local Bridge and Tomahawk Is Drive								

Delay / LOS affected by freeway congestio
Intersection queuing spills back into upstream intersectio

Note 1 The ICU is used for signalized and AWSC intersections. The V/C is used for the critical movement at other intersections.
Note 2 The ODOT V/C standard of 0.85 is used for ramp terminals in the Existing and No-Build scenarios (Action 1F1)
Note 3 The ODOT V/C standard of 0.99 is used for ODOT-controlled intersections along Lombard Street (US-30) and MLK Jr. Boulevard (OR-99W), that are not ramp terminals, for the Existing, No-Build and LPA scenarios as stated in the OHP (Table 7, 2004 update).
Note 4 The PBOT operational standard for signalized intersections is LOS D and, for unsignalized intersections, is LOS E.
Note 5 The ODOT V/C standard of 0.85 is used for ramp terminals in the LPA scenarios that remain unchanged from the No-Build scenario, as stated in the Oregon Highway Plan (Action 1F1). New or reconstructed ramp terminals in the LPA scenarios have a V/C standard of 0.75 as
Note 6 The ODOT V/C standard of 0.85 is used for ODOT-controlled intersections along regional highways or district/local roads in the Build scenarios as stated in the Oregon Highway Design Manual (Table 10-1)
Y* Intersection does not meet the stated standard in the LPA scenarios, but meets the PBOT "do no worse" practice as compared to the No-Build.

Exhibit 7-38

Portland Intersection Performance Results

PM Peak Hour — 2030 No-Build

#	Intersection	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[2,3,4]	Meets Standard	Storage Length	95% Queue (ft)
01	Fremont and MLK Jr.	***Overall Intersection***	93.6	F	0.99	LOS D	N	125	175 (EBL)
								125	150 (NBL)
								125	200 (SBL)
								125	175 (WBL)
02	Going and Interstate	***Overall Intersection***	65.2	E	0.84	LOS D	N	125	225 (NBL)
								125	250 (WBL)
03	Alberta and Interstate	***Overall Intersection***	38.8	D	0.94	LOS D	Y	125	225 (NBL)
								100	150 (SBL)
								965	1150 (NBTR)
04	Alberta and SB I-5 Off-Ramp	***Overall Intersection***	19.5	B	0.52	0.85	Y	75	125 (WBL)
								175	175 (WBT)
05	Alberta and NB I-5 Off-Ramp	***Overall Intersection***	17.3	B	0.74	0.85	Y	75	125 (EBL)
								175	175 (EBT)
06	Alberta and MLK Jr.	***Overall Intersection***	71.9	E	0.91	LOS D	N	100	200 (NBL)
								100	200 (SBL)
07	Rosa Parks and Interstate	***Overall Intersection***	36.3	D	0.75	LOS D	Y	100	200 (WBL)
								175	225 (NBL)
08	Rosa Parks and I-5 SB On-/Off Ramps	***Overall Intersection***	17.2	B	0.52	0.85	Y	125	175 (SWR)
09	Rosa Parks and I-5 NB On-/Off Ramps	***Overall Intersection***	9.3	A	0.40	0.85	Y	-	-
10	Rosa Parks and MLK Jr.	***Overall Intersection***	16.8	B	0.84	LOS D	Y	100	150 (NBL)
11	Lombard and Interstate	***Overall Intersection***	> 100	F	0.95	0.99	Y	100	200 (NBR)
								250	275 (SBL)
								150	250 (EBL)
								150	300 (WBL)
								225	300 (NBL)
								1150	1150 (EBTR)
12	Lombard and I-5 SB On-Ramps	Westbound Thru	7.6	A	0.56	0.85	Y	-	-
13	Lombard and I-5 NB Off-Ramps	Northbound Right	14.9	B	0.55	0.85	Y	-	-
14	Lombard and MLK Jr.	***Overall Intersection***	> 100	F	0.99	0.99	Y	100	200 (EBL)
								100	200 (WBL)
								100	225 (NBL)
								150	250 (SBL)
								1320	1325 (SBTR)
								1730	1750 (EBTR)
15	Interstate and Argyle	***Overall Intersection***	> 100	F	0.63	LOS D	N	1300	1300 (EBLT)
								50	125 (NBL)
								125	125 (NBT)
								75	150 (EBR)
16	Columbia Blvd and I-5 Ramps	***Overall Intersection***	11.7	B	0.57	0.85	Y	-	-
17	Columbia Blvd and MLK Jr.	***Overall Intersection***	83.5	F	0.74	0.99	Y	350	450 (WBL)
								100	225 (NBL)
								225	400 (SBL)
								150	450 (EBR)
18	Victory and Expo Road	***Overall Intersection***	45.6	E	0.39	LOS E	Y	-	-
19	Victory Blvd and I-5 SB On-Ramp	Eastbound Thru	27.7	D	0.28	0.85	Y	75	75 (EBT)
20	Victory Blvd and NB On-/Off-Ramps	***Overall Intersection***	> 100	F	0.31	0.85	Y	290	775 (EBL)
								850	850 (WBT)
								200	225 (WBR)
21	Union Ct and I-5 NB Off-Ramp	Northbound Thru	> 100	F	0.20	0.85	Y	200	300 (EBL)
								1195	1550 (EBR)
22	Union Ct/Marine Way and Vancouver Way	***Overall Intersection***	> 100	F	0.61	LOS E	N	75	200 (SBLTR)
								370	2500 (NBLT)
								370	2500 (NBTR)
								55	100 (SWL)
								55	150 (SWTR)
23	Marine Dr and I-5 On-/Off-Ramps	***Overall Intersection***	> 100	F	0.82	0.85	Y	275	400 (EBL)
								2130	2150 (EBT)
								375	2925 (WBR)
								200	1525 (NBLT)
24	Center Ave and I-5 SB On-/Off Ramps	***Overall Intersection***	24.8	C	0.80	0.85	Y	115	225 (WBLT)
								75	125 (WBR)
25	Hayden Island Dr and Hayden Island Dr South	***Overall Intersection***	69.8	E	0.67	0.85	Y	70	100 (WBLR)
								150	200 (SBL)
								820	825 (SBT)
AA	Vancouver Way and MLK Jr. ramps								
BB	Vancouver Way and new underpass								
CC	Union Ct and new underpass								
DD	Union Ct and MLK ramps								
EE	Connector Road and Marine Drive								
FF	Hayden Island Northbound Off-Ramp								
GG	Hayden Island Southbound On-Ramp								
HH	Hayden Island Northbound On-Ramp								
II	Hayden Island Southbound Off-Ramp								
JJ	Hayden Island Drive and Jantzen Drive								
KK	Tomahawk Island Drive and Jantzen Drive								
LL	Jantzen Ave and Sunrise								
MM	Jantzen Ave and Main Street								
NN	Hayden Island Drive and Main Street								
OO	Hayden Island Drive and Sunrise								
PP	Local Bridge and Little Marine Drive								
QQ	Local Bridge and Tomahawk Is Driv								

2030 LPA Option A with Highway Phasing

#	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[3,4,5,6]	Meets Standard	Storage Length	95% Queue (ft)
01	***Overall Intersection***	61.9	E	0.98	LOS D	Y*	125	150 (EBL)
							125	175 (WBL)
							125	150 (NBL)
							125	225 (SBL)
02	***Overall Intersection***	43.2	D	0.83	LOS D	Y	355	425 (EBL)
							125	200 (WBL)
							175	200 (NBL)
03	***Overall Intersection***	42.9	D	0.90	LOS D	Y	125	200 (NBL)
							100	150 (SBL)
04	***Overall Intersection***	18.5	B	0.56	0.85	Y	75	125 (WBL)
							175	175 (WBT)
05	***Overall Intersection***	20.0	B	0.75	0.85	Y	75	125 (EBL)
							175	175 (EBT)
06	***Overall Intersection***	45.6	D	0.88	LOS D	Y	100	175 (NBL)
							100	175 (SBL)
07	***Overall Intersection***	45.4	D	0.77	LOS D	Y	100	125 (EBL)
							100	175 (WBL)
							175	300 (NBL)
08	***Overall Intersection***	15.5	B	0.54	0.85	Y	125	150 (SWR)
09	***Overall Intersection***	15.7	B	0.59	0.85	Y	190	225 (EBL)
10	***Overall Intersection***	19.5	B	0.82	LOS D	Y	100	150 (NBL)
11	***Overall Intersection***	> 100	F	0.92	0.99	Y	150	250 (EBL)
							1150	1150 (EBTR)
							150	275 (WBL)
							350	425 (NBL)
							100	175 (NBR)
							325	450 (SBL)
12	Eastbound Thru/Right	4.8	A	0.54	0.85	Y	-	-
13	***Overall Intersection***	4.6	A	0.53	0.85	Y	-	-
14	***Overall Intersection***	> 100	F	0.90	0.99	Y	100	175 (EBL)
							1750	1750 (EBTR)
							100	200 (WBL)
							100	200 (NBL)
							150	300 (SBL)
15	***Overall Intersection***	19.5	B	0.66	LOS D	Y	75	150 (EBR)
							50	75 (NBL)
							125	125 (NBT)
16	***Overall Intersection***	14.4	B	0.51	0.85	Y	-	-
17	***Overall Intersection***	46.3	D	0.77	0.99	Y	350	425 (WBL)
							100	225 (NBL)
							225	400 (SBL)
18	***Overall Intersection***	5.4	A	0.41	LOS E	Y	-	-
19	Westbound Left/Thru	2.0	A	0.18	0.85	Y	-	-
20	***Overall Intersection***	13.5	B	0.50	0.85	Y	-	-
21								
22								
23	***Overall Intersection***	22.1	C	0.64	0.75	Y	-	-
24								
25								
AA	***Overall Intersection***	21.3	C	0.66	0.75	Y	-	-
BB	***Overall Intersection***	23.9	C	0.64	LOS D	Y	-	-
CC	Eastbound Left/Right	9.0	A	0.06	LOS E	Y	-	-
DD	Westbound Right	5.8	A	0.60	0.75	Y	-	-
EE	Southbound Left/Right	12.4	B	0.07	LOS E	Y	-	-
FF	***Overall Intersection***	13.3	B	0.31	0.75	Y	-	-
GG	***Overall Intersection***	6.4	A	0.39	0.75	Y	-	-
HH	***Overall Intersection***	11.3	B	0.52	0.75	Y	-	-
II	***Overall Intersection***	6.8	A	0.54	0.75	Y	-	-
JJ	***Overall Intersection***	12.5	B	0.51	0.85	Y	-	-
KK	***Overall Intersection***	20.1	C	0.63	0.85	Y	-	-
LL	Southbound Left/Right	5.3	A	0.06	0.85	Y	-	-
MM	***Overall Intersection***	11.6	B	0.56	0.85	Y	-	-
NN	***Overall Intersection***	21.7	C	0.57	0.85	Y	-	-
OO	Northbound Right	5.4	A	0.23	0.85	Y	-	-
PP	***Overall Intersection***	5.4	A	0.44	LOS D	Y	-	-
QQ	***Overall Intersection***	6.2	A	0.34	LOS D	Y	-	-

2030 LPA Option A

#	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[3,4,5,6]	Meets Standard	Storage Length	95% Queue (ft)
01	***Overall Intersection***	61.9	E	0.98	LOS D	Y*	125	150 (EBL)
							125	175 (WBL)
							125	150 (NBL)
							125	225 (SBL)
02	***Overall Intersection***	43.2	D	0.83	LOS D	Y	355	425 (EBL)
							125	200 (WBL)
							175	200 (NBL)
03	***Overall Intersection***	42.9	D	0.90	LOS D	Y	125	200 (NBL)
							100	150 (SBL)
04	***Overall Intersection***	18.5	B	0.56	0.85	Y	75	125 (WBL)
							175	175 (WBT)
05	***Overall Intersection***	20.0	B	0.75	0.85	Y	75	125 (EBL)
							175	175 (EBT)
06	***Overall Intersection***	45.6	D	0.88	LOS D	Y	100	175 (NBL)
							100	175 (SBL)
07	***Overall Intersection***	45.4	D	0.77	LOS D	Y	100	125 (EBL)
							100	175 (WBL)
							175	300 (NBL)
08	***Overall Intersection***	15.5	B	0.54	0.85	Y	125	150 (SWR)
09	***Overall Intersection***	15.7	B	0.59	0.85	Y	190	225 (EBL)
10	***Overall Intersection***	19.5	B	0.82	LOS D	Y	100	150 (NBL)
11	***Overall Intersection***	> 100	F	0.92	0.99	Y	150	250 (EBL)
							1150	1150 (EBTR)
							150	275 (WBL)
							350	425 (NBL)
							100	175 (NBR)
							325	450 (SBL)
12	Eastbound Thru/Right	4.8	A	0.54	0.85	Y	-	-
13	***Overall Intersection***	4.6	A	0.53	0.85	Y	-	-
14	***Overall Intersection***	> 100	F	0.90	0.99	Y	100	175 (EBL)
							1750	1750 (EBTR)
							100	200 (WBL)
							100	200 (NBL)
							150	300 (SBL)
15	***Overall Intersection***	19.5	B	0.66	LOS D	Y	75	150 (EBR)
							50	75 (NBL)
							125	125 (NBT)
16	***Overall Intersection***	14.4	B	0.51	0.85	Y	-	-
17	***Overall Intersection***	46.3	D	0.77	0.99	Y	350	425 (WBL)
							100	225 (NBL)
							225	400 (SBL)
18	***Overall Intersection***	5.4	A	0.41	LOS E	Y	-	-
19	Westbound Left/Thru	2.0	A	0.18	0.85	Y	-	-
20	***Overall Intersection***	13.5	B	0.50	0.85	Y	-	-
21								
22								
23	***Overall Intersection***	11.6	B	0.42	0.75	Y	-	-
24								
25								
AA	***Overall Intersection***	19.8	B	0.66	0.75	Y	-	-
BB	***Overall Intersection***	23.2	C	0.64	LOS D	Y	-	-
CC	Eastbound Left/Right	11.8	B	0.06	LOS E	Y	-	-
DD	Westbound Right	5.9	A	0.60	0.75	Y	-	-
EE	Southbound Left/Right	17.7	B	0.07	LOS E	Y	-	-
FF	***Overall Intersection***	12.8	B	0.31	0.75	Y	-	-
GG	***Overall Intersection***	5.8	A	0.39	0.75	Y	-	-
HH	***Overall Intersection***	11.6	B	0.52	0.75	Y	-	-
II	***Overall Intersection***	6.4	A	0.54	0.75	Y	-	-
JJ	***Overall Intersection***	12.0	B	0.51	0.85	Y	-	-
KK	***Overall Intersection***	19.9	B	0.63	0.85	Y	-	-
LL	Southbound Left/Right	7.1	A	0.06	0.85	Y	-	-
MM	***Overall Intersection***	11.1	B	0.56	0.85	Y	-	-
NN	***Overall Intersection***	22.0	C	0.57	0.85	Y	-	-
OO	Northbound Right	5.6	A	0.23	0.85	Y	-	-
PP	***Overall Intersection***	5.6	A	0.44	LOS D	Y	-	-
QQ	***Overall Intersection***	6.0	A	0.34	LOS D	Y	-	-

2030 LPA Option B with Highway Phasing

#	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[3,4,5,6]	Meets Standard	Storage Length	95% Queue (ft)
01	***Overall Intersection***	61.9	E	0.98	LOS D	Y*	125	150 (EBL)
							125	175 (WBL)
							125	150 (NBL)
							125	225 (SBL)
02	***Overall Intersection***	43.2	D	0.83	LOS D	Y	355	425 (EBL)
							125	200 (WBL)
							175	200 (NBL)
03	***Overall Intersection***	42.9	D	0.90	LOS D	Y	125	200 (NBL)
							100	150 (SBL)
04	***Overall Intersection***	18.5	B	0.56	0.85	Y	75	125 (WBL)
							175	175 (WBT)
05	***Overall Intersection***	20.0	B	0.75	0.85	Y	75	125 (EBL)
							175	175 (EBT)
06	***Overall Intersection***	45.6	D	0.88	LOS D	Y	100	175 (NBL)
							100	175 (SBL)
07	***Overall Intersection***	45.4	D	0.77	LOS D	Y	100	125 (EBL)
							100	175 (WBL)
							175	300 (NBL)
08	***Overall Intersection***	15.5	B	0.54	0.85	Y	125	150 (SWR)
09	***Overall Intersection***	15.7	B	0.59	0.85	Y	190	225 (EBL)
10	***Overall Intersection***	19.5	B	0.82	LOS D	Y	100	150 (NBL)
11	***Overall Intersection***	> 100	F	0.92	0.99	Y	150	250 (EBL)
							1150	1150 (EBTR)
							150	275 (WBL)
							350	425 (NBL)
							100	175 (NBR)
							325	450 (SBL)
12	Eastbound Thru/Right	4.8	A	0.54	0.85	Y	-	-
13	***Overall Intersection***	4.6	A	0.53	0.85	Y	-	-
14	***Overall Intersection***	> 100	F	0.90	0.99	Y	100	175 (EBL)
							1750	1750 (EBTR)
							100	200 (WBL)
							100	200 (NBL)
							150	300 (SBL)
15	***Overall Intersection***	19.5	B	0.66	LOS D	Y	75	150 (EBR)
							50	75 (NBL)
							125	125 (NBT)
16	***Overall Intersection***	14.4	B	0.51	0.85	Y	-	-
17	***Overall Intersection***	46.3	D	0.77	0.99	Y	350	425 (WBL)
							100	225 (NBL)
							225	400 (SBL)
18	***Overall Intersection***	5.4	A	0.41	LOS E	Y	-	-
19	Westbound Left/Thru	2.0	A	0.18	0.85	Y	-	-
20	***Overall Intersection***	13.5	B	0.50	0.85	Y	-	-
21								
22								
23	***Overall Intersection***	32.1	C	0.71	0.75	Y	-	-
24								
25								
AA	***Overall Intersection***	18.3	B	0.63	0.75	Y	-	-
BB	***Overall Intersection***	27.7	C	0.62	LOS D	Y	-	-
CC	Northbound Thru	5.3	A	0.48	LOS E	Y	-	-
DD	Westbound Right	7.0	A	0.66	0.75	Y	-	-
EE	***Overall Intersection***	12.5	B	0.66	LOS D	Y	-	-
FF	***Overall Intersection***	12.1	B	0.61	0.75	Y	-	-
GG	***Overall Intersection***	5.2	A	0.52	0.75	Y	-	-
HH	***Overall Intersection***	14.3	B	0.52	0.75	Y	-	-
II	***Overall Intersection***	7.6	A	0.52	0.75	Y	-	-
JJ	***Overall Intersection***	11.1	B	0.61	0.85	Y	-	-
KK	***Overall Intersection***	17.5	B	0.65	0.85	Y	-	-
LL	Southbound Right	4.1	A	0.03	0.85	Y	-	-
MM	***Overall Intersection***	8.1	A	0.57	0.85	Y	-	-
NN	***Overall Intersection***	21.6	C	0.56	0.85	Y	-	-
OO	Northbound Right	7.9	A	0.35	0.85	Y	-	-
PP								
QQ								

2030 LPA Option B

#	Approach/Movement	Delay (Seconds)	LOS	ICU / V/C[1]	Standard[3,4,5,6]	Meets Standard	Storage Length	95% Queue (ft)
01	***Overall Intersection***	61.9	E	0.98	LOS D	Y*	125	150 (EBL)
							125	175 (WBL)
							125	150 (NBL)
							125	225 (SBL)
02	***Overall Intersection***	43.2	D	0.83	LOS D	Y	355	425 (EBL)
							125	200 (WBL)
							175	200 (NBL)
03	***Overall Intersection***	42.9	D	0.90	LOS D	Y	125	200 (NBL)
							100	150 (SBL)
04	***Overall Intersection***	18.5	B	0.56	0.85	Y	75	125 (WBL)
							175	175 (WBT)
05	***Overall Intersection***	20.0	B	0.75	0.85	Y	75	125 (EBL)
							175	175 (EBT)
06	***Overall Intersection***	45.6	D	0.88	LOS D	Y	100	175 (NBL)
							100	175 (SBL)
07	***Overall Intersection***	45.4	D	0.77	LOS D	Y	100	125 (EBL)
							100	175 (WBL)
							175	300 (NBL)
08	***Overall Intersection***	15.5	B	0.54	0.85	Y	125	150 (SWR)
09	***Overall Intersection***	15.7	B	0.59	0.85	Y	190	225 (EBL)
10	***Overall Intersection***	19.5	B	0.82	LOS D	Y	100	150 (NBL)
11	***Overall Intersection***	> 100	F	0.92	0.99	Y	150	250 (EBL)
							1150	1150 (EBTR)
							150	275 (WBL)
							350	425 (NBL)
							100	175 (NBR)
							325	450 (SBL)
12	Eastbound Thru/Right	4.8	A	0.54	0.85	Y	-	-
13	***Overall Intersection***	4.6	A	0.53	0.85	Y	-	-
14	***Overall Intersection***	> 100	F	0.90	0.99	Y	100	175 (EBL)
							1750	1750 (EBTR)
							100	200 (WBL)
							100	200 (NBL)
							150	300 (SBL)
15	***Overall Intersection***	19.5	B	0.66	LOS D	Y	75	150 (EBR)
							50	75 (NBL)
							125	125 (NBT)
16	***Overall Intersection***	14.4	B	0.51	0.85	Y	-	-
17	***Overall Intersection***	46.3	D	0.77	0.99	Y	350	425 (WBL)
							100	225 (NBL)
							225	400 (SBL)
18	***Overall Intersection***	5.4	A	0.41	LOS E	Y	-	-
19	Westbound Left/Thru	2.0	A	0.18	0.85	Y	-	-
20	***Overall Intersection***	13.5	B	0.50	0.85	Y	-	-
21								
22								
23	***Overall Intersection***	13.1	B	0.46	0.75	Y	-	-
24								
25								
AA	***Overall Intersection***	17.1	B	0.63	0.75	Y	-	-
BB	***Overall Intersection***	27.5	C	0.62	LOS D	Y	-	-
CC	Northbound Thru	5.5	A	0.48	LOS E	Y	-	-
DD	Westbound Right	7.3	A	0.66	0.75	Y	-	-
EE	***Overall Intersection***	11.2	B	0.66	LOS D	Y	-	-
FF	***Overall Intersection***	15.3	B	0.61	0.75	Y	-	-
GG	***Overall Intersection***	5.2	A	0.52	0.75	Y	-	-
HH	***Overall Intersection***	14.3	B	0.52	0.75	Y	-	-
II	***Overall Intersection***	7.6	A	0.52	0.75	Y	-	-
JJ	***Overall Intersection***	11.1	B	0.61	0.85	Y	-	-
KK	***Overall Intersection***	17.5	B	0.65	0.85	Y	-	-
LL	Southbound Right	4.1	A	0.03	0.85	Y	-	-
MM	***Overall Intersection***	8.1	A	0.57	0.85	Y	-	-
NN	***Overall Intersection***	21.6	C	0.56	0.85	Y	-	-
OO	Northbound Right	7.9	A	0.35	0.85	Y	-	-
PP								
QQ								

Delay / LOS affected by freeway congestio

Intersection queuing spills back into upstream intersectic

Note 1 The ICU is used for signalized and AWSC intersections. The V/C is used for the critical movement at other intersections.
Note 2 The ODOT V/C standard of 0.85 is used for ramp terminals in the Existing and No-Build scenarios (Action 1F1)
Note 3 The ODOT V/C standard of 0.99 is used for ODOT-controlled intersections along Lombard Street (US-30) and MLK Jr. Boulevard (OR-99W), that are not ramp terminals, for the Existing, No-Build and LPA scenarios as stated in the OHP (Table 7, 2004 update).
Note 4 The PBOT operational standard for signalized intersections is LOS D and, for unsignalized intersections, is LOS E.
Note 5 The ODOT V/C standard of 0.85 is used for ramp terminals in the LPA scenarios that remain unchanged from the No-Build scenario, as stated in the Oregon Highway Plan (Action 1F1). New or reconstructed ramp terminals in the LPA scenarios have a V/C standard of 0.75
Note 6 The ODOT V/C standard of 0.85 is used for ODOT-controlled intersections along regional highways or district/local roads in the Build scenarios as stated in the Oregon Highway Design Manual (Table 10-1)
Y* Intersection does not meet the stated standard in the LPA scenarios, but meets the PBOT "do no worse" practice as compared to the No-Build.

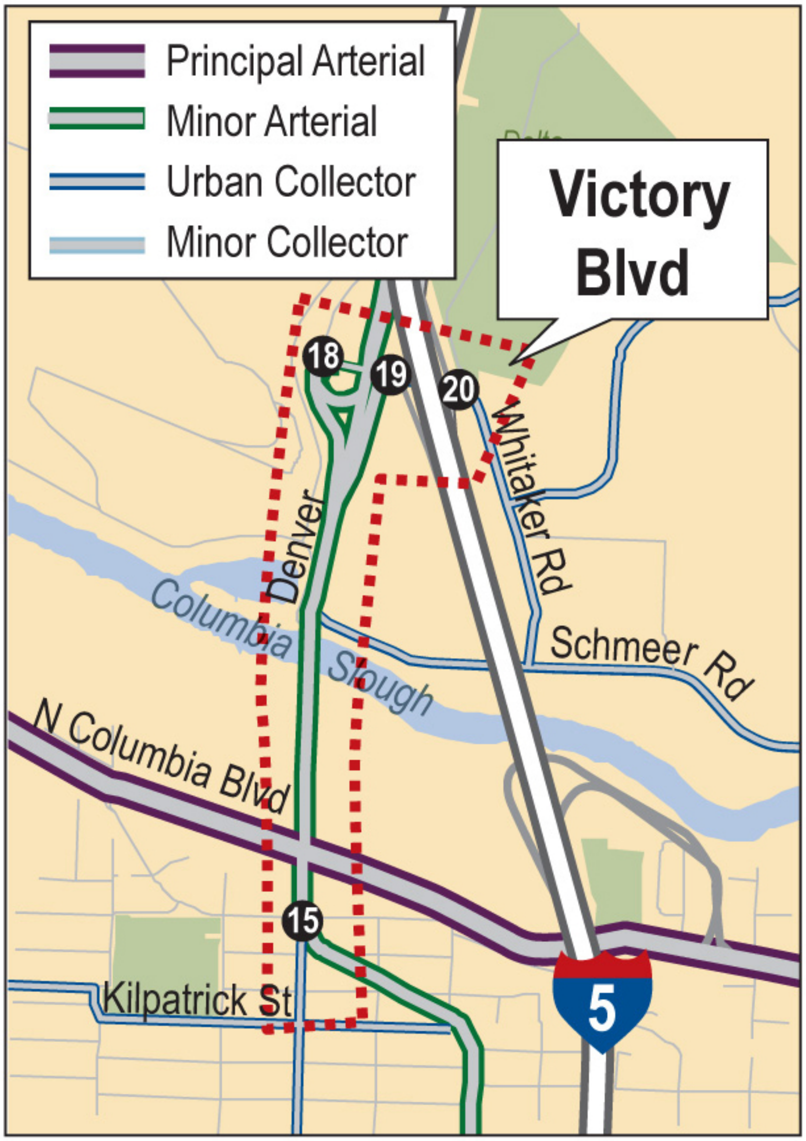
Exhibit 7-39

- Principal Arterial
- Minor Arterial
- Collector
- Intersection Analyzed
- Sub-areas
- New Bridge
- Existing Bridge
- Roadway Improvements
- Tunnel
- New Transit Alignment
- New Bicycle/Pedestrian Route
- Existing MAX Yellow Line/Station
- Parks
- Ponds
- Sidewalks

LPA
Marine Drive Interchange Sub-area

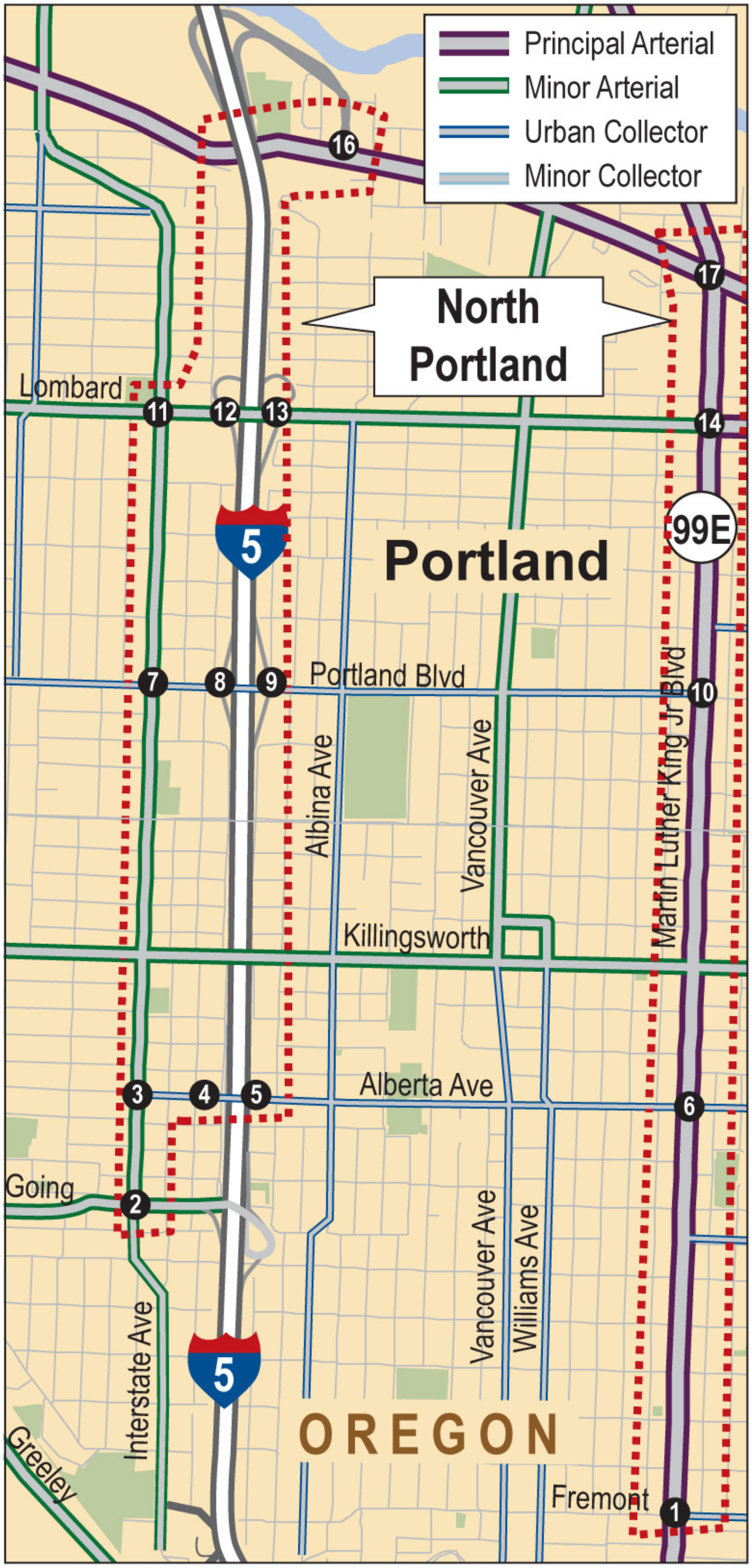
Columbia River CROSSING

Exhibit 7-40



Principal Arterial
Minor Arterial
Urban Collector
Minor Collector
Victory Blvd
18
19
20
15
Denver
Whitaker Rd
Columbia Slough
Schmeer Rd
N Columbia Blvd
Kilpatrick St
5

Exhibit 7-41



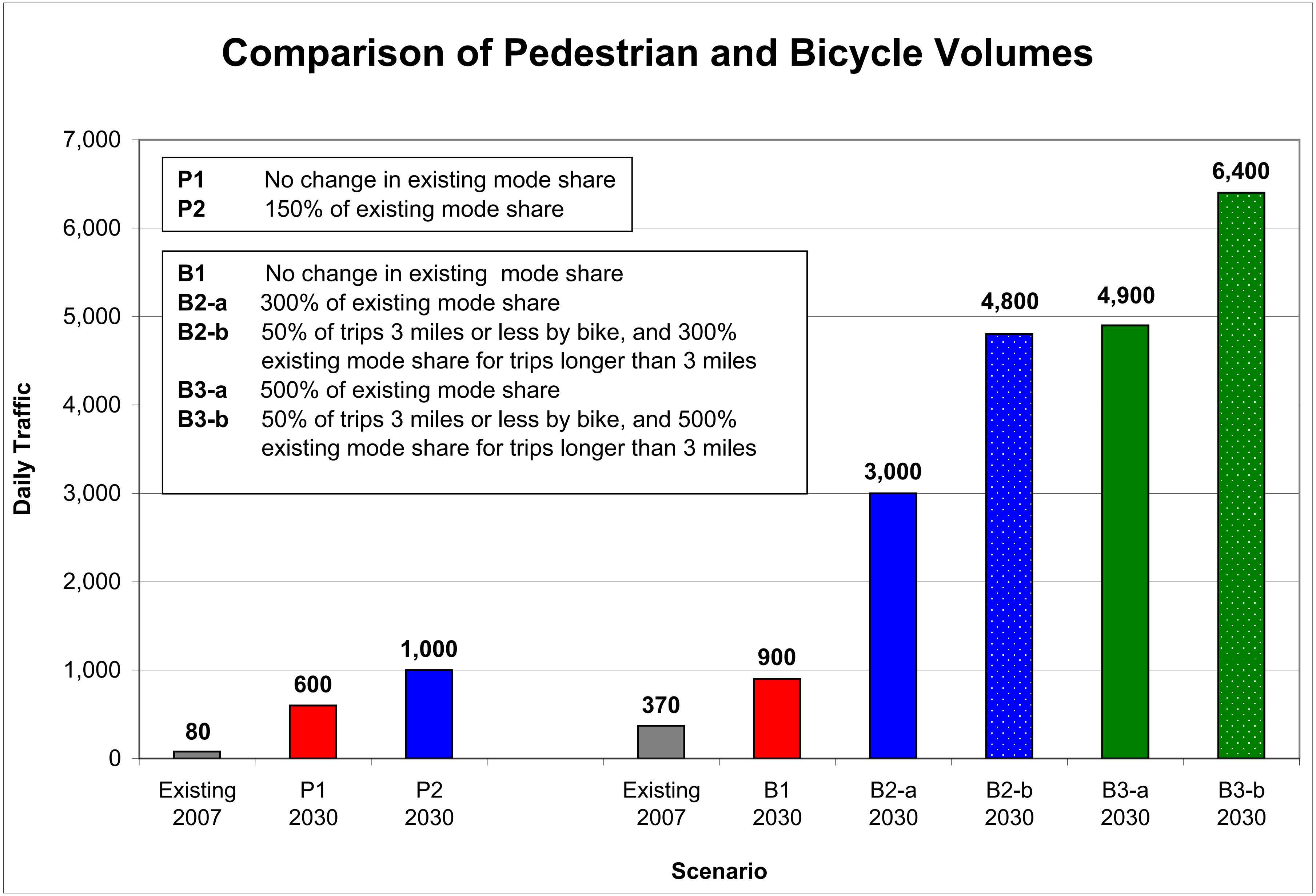
Principal Arterial
Minor Arterial
Urban Collector
Minor Collector
North Portland
Portland
Lombard
Portland Blvd
Killingsworth
Alberta Ave
Going
Albina Ave
Vancouver Ave
Williams Ave
Martin Luther King Jr Blvd
Interstate Ave
Greeley
Fremont
99E
5
OREGON
1
2
3
4
5
6
7
8
9
10
11
12
13
14
16
17

Exhibit 7-42

Bicycle Scenarios	Description
B1	No change in existing mode share for all trip lengths
B2-a	300% of existing mode share for all trip lengths
B2-b	50% of all trips 3 miles or less are made by bicycle, and 300% of existing mode share for all trips longer than 3 miles
B3-a	500% of existing mode share for all trip lengths
B3-b	50% of all trips 3 miles or less are made by bicycle, and 500% of existing mode share for all trips longer than 3 miles

Pedestrian Scenarios	Description
P1	No change in existing mode share for all trip lengths
P2	150% of existing mode share for all trip lengths

Exhibit 7-43



Comparison of Pedestrian and Bicycle Volumes
P1 No change in existing mode share
P2 150% of existing mode share
B1 No change in existing mode share
B2-a 300% of existing mode share
B2-b 50% of trips 3 miles or less by bike, and 300% existing mode share for trips longer than 3 miles
B3-a 500% of existing mode share
B3-b 50% of trips 3 miles or less by bike, and 500% existing mode share for trips longer than 3 miles
Daily Traffic
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
80
600
1,000
370
900
3,000
4,800
4,900
6,400
Existing 2007
P1 2030
P2 2030
Existing 2007
B1 2030
B2-a 2030
B2-b 2030
B3-a 2030
B3-b 2030
Scenario

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8. Tolling Effects on Traffic

8.1 Description of Tolling Scenarios

As a part of the LPA, all motor vehicle users on I-5 crossing the Columbia River would pay a toll. Open Road Tolling (ORT) technology would be used. ORT allows the collection of tolls without the use of lane-dividing barriers or toll-booths. With ORT, users are able to drive through at highway speeds without having to slow down at barriers or to physically pay a toll. Full use of ORT eliminates the need for toll plazas.

Tolls would be tracked using transponders affixed to vehicles. Motorists would establish a pre-paid account for their transponder. For vehicles without a transponder, license plate images would be scanned and users would be mailed a bill.

Exhibit 8-1 summarizes the tolling rate structure assumed for analysis purposes for the LPA. The values shown are example tolling rates for planning and testing purposes only. Actual toll rates will depend upon a final finance plan and will be determined by the Oregon and Washington state transportation commission's with approval by the state legislatures.

Toll rates are assumed to vary depending upon time of day. Medium trucks are assumed to be charged twice the rate of passenger vehicles, and heavy trucks would pay four times the passenger car rate.

With I-5 only tolled, tolls would be administered for each direction of travel along I-5. For example, a vehicle with a transponder traveling southbound across the bridge at 8 a.m. and northbound across the bridge at 5 p.m. would pay two dollars each way, for a total of four dollars in tolls.

Exhibit 8-1 also summarizes a testing scenario if both the I-5 and I-205 bridges were tolled. This is not a part of the LPA, but was evaluated for comparison purposes. Under this scenario, it was assumed vehicles would be tolled in the southbound direction only across the bridges.

Traffic volumes crossing the Columbia River along I-5 and I-205 were estimated for the LPA (where I-5 is tolled). Sensitivity tests were also conducted for a no-toll condition and a scenario where both the I-5 and I-205 Columbia River bridges were tolled.

8.2 I-5 and I-205 Traffic Volumes

Exhibit 8-2 illustrates daily traffic volumes predicted to cross the I-5 and I-205 bridges in 2030 under several scenarios.

The LPA, which assumes a toll on the I-5 bridge, would result in 178,500 vehicles crossing the I-5 bridge daily and 214,500 vehicles crossing the I-205 bridge. Compared to the No-Build Alternative, the LPA would result in three percent less traffic on I-5 and two percent more traffic on I-205. Less traffic would result along I-5 due to the provision of tolling and light rail transit (in addition, the duration of daily traffic congestion along I-5 would decrease substantially, as discussed in Section 7.2.4).

Daily traffic increases along I-205 and connecting highways would be marginal. For example, I-205's traffic volumes would increase by one percent south of I-84, while I-84's traffic levels would increase by one percent west of I-205 and by 0.2 percent east of I-205. Airport Way's traffic volumes would increase by 1.4 percent west of I-205 and by 0.5 percent east of I-205.

If the LPA was constructed, but tolling was not provided, I-5's daily traffic would be 23 percent higher than the tolled condition. I-205's daily volumes would be five percent less.

For sensitivity, a test run where both I-5 and I-205 were tolled, total cross-river vehicle trips would be the lowest. However, I-5 vehicle trips would be 11 percent higher than the LPA with I-5 tolling (I-205 trips would be 18 percent less).

The LPA with highway phasing option would result in similar traffic levels on the I-5 and I-205 bridges compared to the LPA.

Exhibit 8-1

Columbia River CROSSING

Rate Schedules for I-5 Toll Scenarios

	Time Period	No Tolls	Tolling I-5: One-Way Tolls, Both Directions	Tolling I-5 & I-205: Roundtrip Tolls, Northbound	Tolling I-5 & I-205: Roundtrip Tolls, Southbound
2006 Dollars	Midnight to 5 AM	No Toll Collected	$1.00	No Toll Collected	$2.00
2006 Dollars	5 AM to 6 AM	No Toll Collected	$1.50	No Toll Collected	$3.00
2006 Dollars	6 AM to 7 AM	No Toll Collected	$2.00	No Toll Collected	$4.00
2006 Dollars	7 AM to 9 AM	No Toll Collected	$2.00	No Toll Collected	$4.00
2006 Dollars	9 AM to 10 AM	No Toll Collected	$2.00	No Toll Collected	$4.00
2006 Dollars	10 AM to 3 PM	No Toll Collected	$1.50	No Toll Collected	$3.00
2006 Dollars	3 PM to 4 PM	No Toll Collected	$2.00	No Toll Collected	$4.00
2006 Dollars	4 PM to 6 PM	No Toll Collected	$2.00	No Toll Collected	$4.00
2006 Dollars	6 PM to 7 PM	No Toll Collected	$2.00	No Toll Collected	$4.00
2006 Dollars	7 PM to 8 PM	No Toll Collected	$1.50	No Toll Collected	$3.00
2006 Dollars	8 PM to midnight	No Toll Collected	$1.00	No Toll Collected	$2.00
2017 Dollars	Midnight to 5 AM	No Toll Collected	$1.31	No Toll Collected	$2.62
2017 Dollars	5 AM to 6 AM	No Toll Collected	$1.97	No Toll Collected	$3.94
2017 Dollars	6 AM to 7 AM	No Toll Collected	$2.62	No Toll Collected	$5.25
2017 Dollars	7 AM to 9 AM	No Toll Collected	$2.62	No Toll Collected	$5.25
2017 Dollars	9 AM to 10 AM	No Toll Collected	$2.62	No Toll Collected	$5.25
2017 Dollars	10 AM to 3 PM	No Toll Collected	$1.97	No Toll Collected	$3.94
2017 Dollars	3 PM to 4 PM	No Toll Collected	$2.62	No Toll Collected	$5.25
2017 Dollars	4 PM to 6 PM	No Toll Collected	$2.62	No Toll Collected	$5.25
2017 Dollars	6 PM to 7 PM	No Toll Collected	$2.62	No Toll Collected	$5.25
2017 Dollars	7 PM to 8 PM	No Toll Collected	$1.97	No Toll Collected	$3.94
2017 Dollars	8 PM to midnight	No Toll Collected	$1.31	No Toll Collected	$2.62

Notes

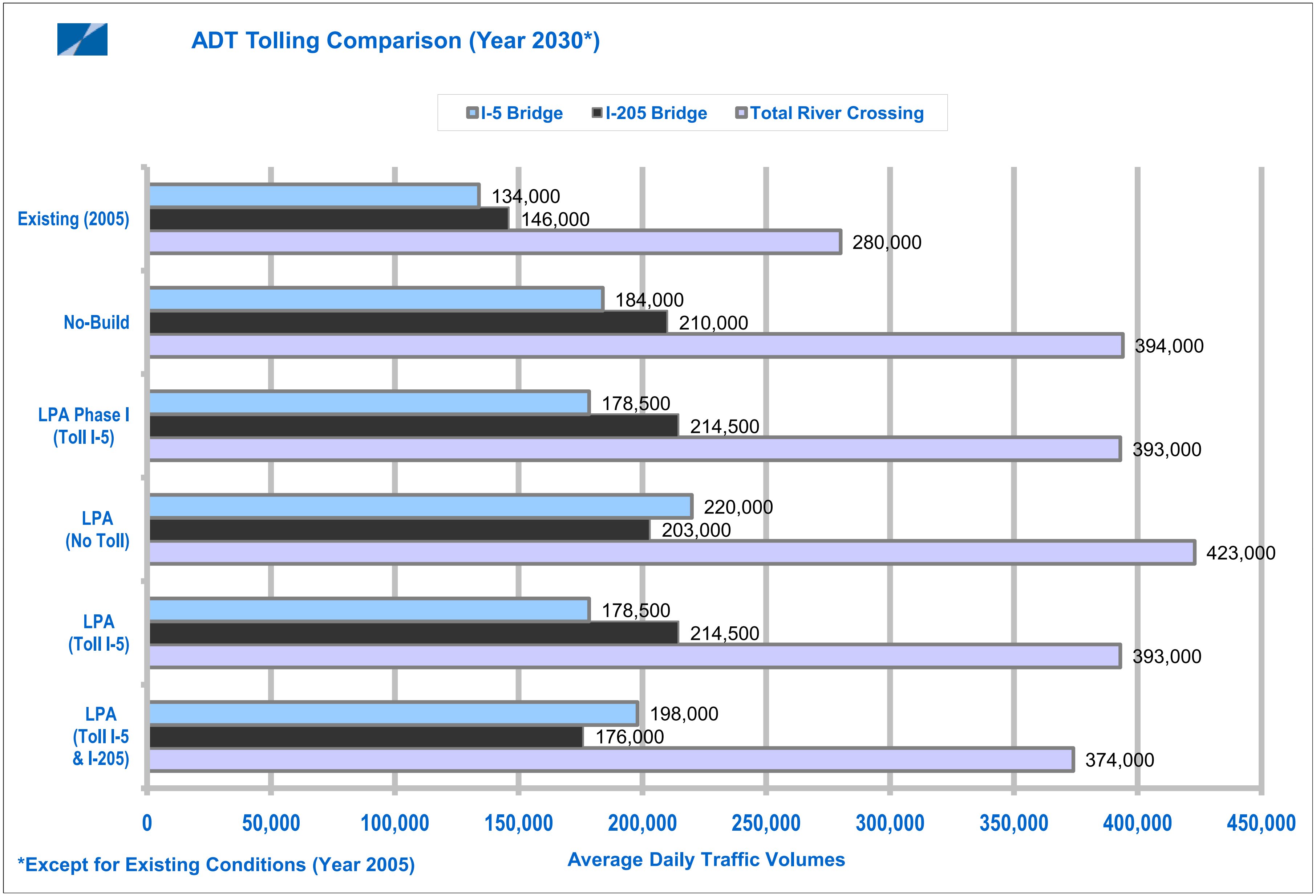
1. These are example tolling rates for planning and testing purposes. Actual toll rates will depend on a final finance plan and determined by the Oregon and Washington state transportation commissions with approval by the state legislatures.

2. Funding contribution assumes a 30-year bond.

3. Assumes medium trucks pay 2x and large trucks pay 4x the auto toll rate using a transponder; administrative fee would be added to process payments not involving a transponder.

4. Tolls escalated at 2.5% per year to match expected inflation.

Exhibit 8-2



ADT Tolling Comparison (Year 2030*)
I-5 Bridge
I-205 Bridge
Total River Crossing
Existing (2005)
134,000
146,000
280,000
No-Build
184,000
210,000
394,000
LPA Phase I (Toll I-5)
178,500
214,500
393,000
LPA (No Toll)
220,000
203,000
423,000
LPA (Toll I-5)
178,500
214,500
393,000
LPA (Toll I-5 & I-205)
198,000
176,000
374,000
0
50,000
100,000
150,000
200,000
250,000
300,000
350,000
400,000
450,000
*Except for Existing Conditions (Year 2005)
Average Daily Traffic Volumes